

STATUTORY FIVE-YEAR REVIEW

First Operable Unit
United States Environmental Protection Agency's
Rocky Mountain Arsenal Off-Post
Remedial Investigation/Feasibility Study Site
(Klein Water Treatment Facility)

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Region VIII
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I. BACKGROUND

Pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by section 121(c), and section 300.430 (f) (4) (ii) of the National Contingency Plan (NCP), a statutory review is required for remedial actions selected on or after October 17, 1986 for certain sites. The review must be completed within five years of the initiation of the remedial action, and every five years thereafter, for sites which will not allow for unlimited use and unrestricted exposure after attainment of the performance standards stated in the Record of Decision (ROD).

A statutory review is required for the First Operable Unit (OU1), U.S. Environmental Protection Agency's (EPA's) Rocky Mountain Arsenal (RMA) Off-Post Remedial Investigation/Feasibility Study (RI/FS) Site, standards as stated in the ROD have been attained, although the aquifer remains contaminated which will not allow for unlimited use and unrestricted exposure. It should be noted that the cleanup goals as stated in the ROD are the attainment of Safe Drinking Water Act (SDWA) standards for South Adams County Water and Sanitation District (SACWSD) tap water, not the cleanup of the aquifer. The remedial action for OU1, RMA Off-Post RI/FS Site, was initiated July 1, 1987, requiring the five-year review to be complete by the end of fiscal year 1992, i.e., September 30, 1992. The remedial action initiation date of July 1, 1987 was triggered by the remedial design concurrence between EPA and the U.S. Department of Army (DOA).

EPA has established a three-tier approach to conducting five-year reviews, the most basic of which provides a minimum protectiveness evaluation (Level I review). The second and third levels (Level II and Level III) of review are intended to provide the flexibility to respond to varying site-specific considerations, employing further analysis. EPA contemplates that a Level I review will be appropriate in all but relatively few cases where site-specific circumstances suggest another level. The level of review is based on site-specific considerations, including the nature of the response action, the status of on-site response activities, and the proximity to populated areas and sensitive environmental areas. Based upon these considerations and the operating efficiency of the remedial action, EPA has determined that a Level I review is appropriate at this site.

A Level I five-year review is required in this instance to confirm that the remedial actions and associated performance standards as presented in the ROD of June 4, 1987, adequately protect human health and the environment (i.e., the remedial action is operating and functioning as designed, institutional controls are in place and are protective), and to evaluate whether original performance standards remain protective of human health and the environment.

A further objective of this five-year review is to consider site-specific factors (e.g., scope of operation and maintenance (O & M), frequency of repairs, changes in monitoring indicators, costs), and how each factor relates to site protectiveness.

II. INTRODUCTION

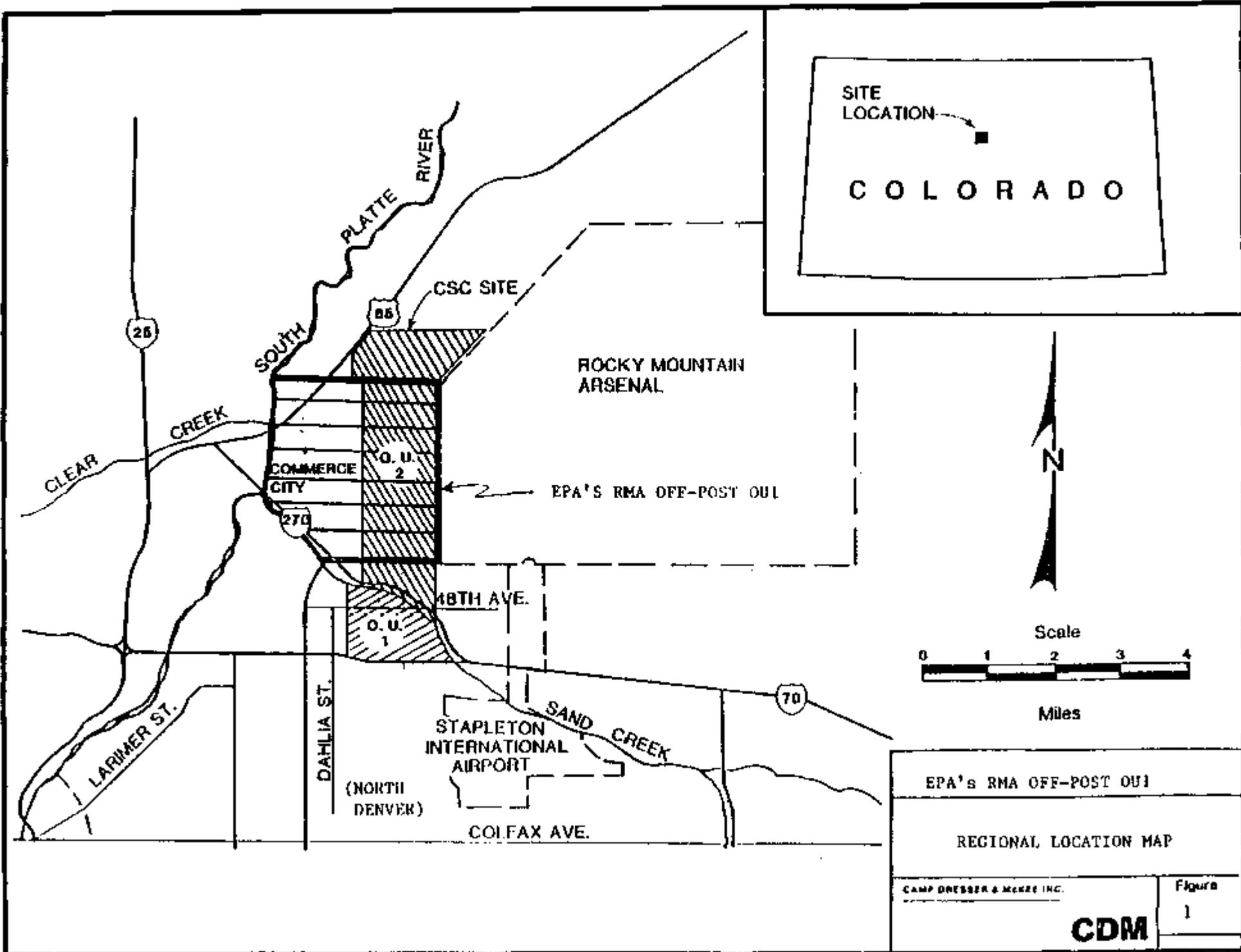
SITE LOCATION AND DESCRIPTION

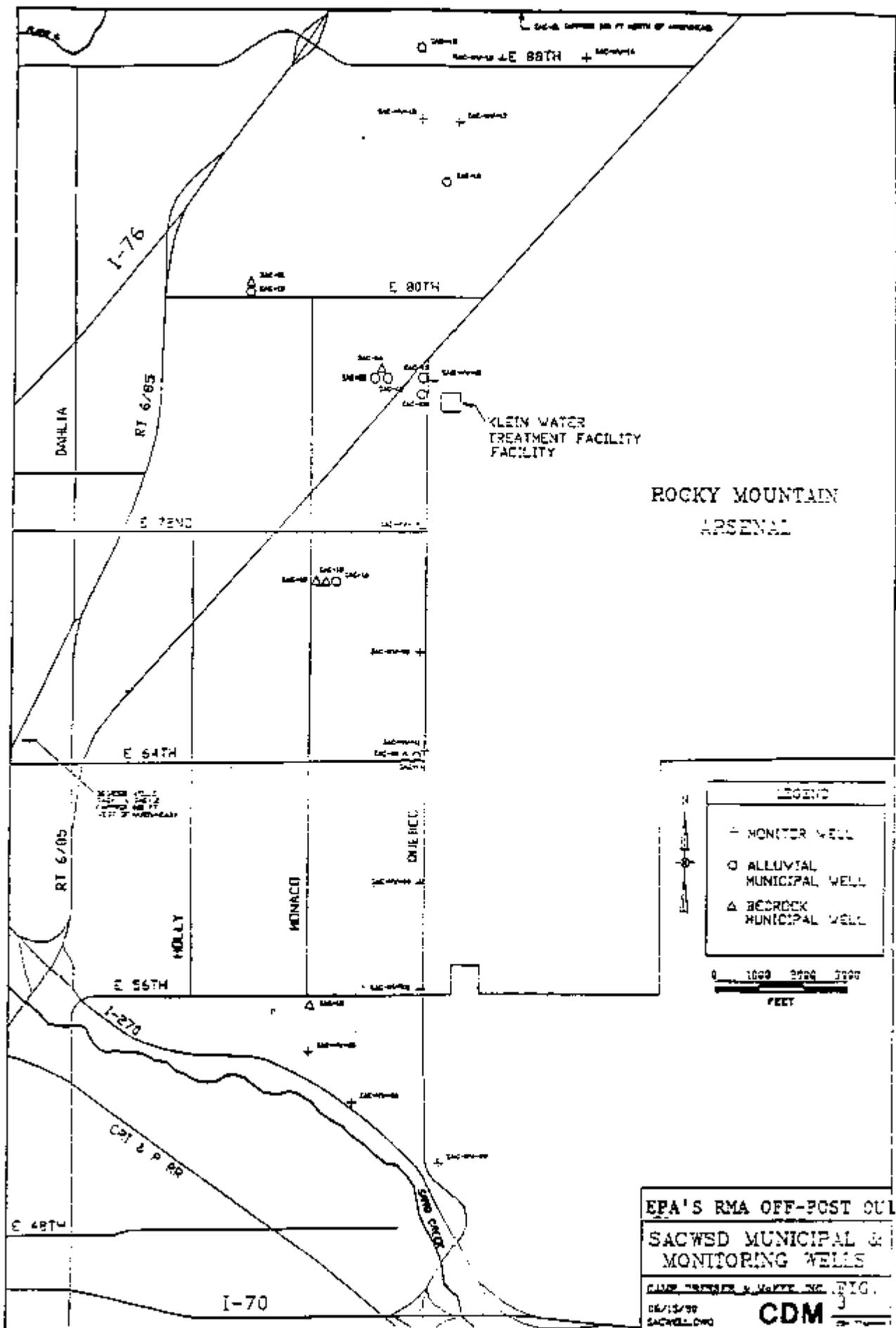
Rocky Mountain Arsenal (RMA) is a facility owned by the United States Department of the Army located about 10 miles northeast of downtown Denver. RMA was established in 1942 with the primary mission of manufacturing and assembling chemical and incendiary weapons. Subsequently, various pesticides were produced on-post by private lessees. Many of these substances, including the by-products and residues, were disposed of on-post.

RMA was initially identified as one of two or more sources for groundwater contamination in south Adams County. Further studies resulted in the investigation of Chemical Sales Company (CSC) and others as potential contributors to the groundwater contamination. Part of the RMA groundwater contamination affects drinking water supplies to the west.

EPA's RMA Off-Post OU1 encompasses a large part of the municipality of Commerce City, and a portion of north Denver, see Figure 1. As shown in Figure 1, EPA's RMA Off-Post OU1 was overlain by portions of the later defined Chemical Sales Corporation Superfund Site (CSC) OU2. EPA's RMA Off-Post OU1 is located adjacent to RMA, extending westward from RMA to the South Platte River. The southern boundary is formed by 56th Avenue and Sand Creek, and the northern boundary by 80th Avenue from RMA to the South Platte River, see Figure 2. The area is developed with residential subdivisions, industrial facilities and gravel pit operations. The Army's RMA Off-Post OU extends northward from 80th Ave, while the Army's RMA On-Post OU includes all of RMA proper.

The South Adams County Water and Sanitation District (SACWSD) supplies approximately 30,000 customers with water received from seven deep wells and eight shallow alluvial wells. Most of SACWSD's wells are located south of 80th Avenue in Commerce City and within 1,500 feet of the Arsenal's western boundary, see Figure 3. Six of the shallow wells are contaminated with a variety of volatile organic chemicals (VOCs). Groundwater sampling in 1986 detected six VOCs present within the EPA's RMA Off-Post OU1 area. The compounds detected were 1,1-Dichloroethane (1,1-DCA), 1,1-Dichloroethene (1,1-DCE), trans 1,2-Dichloroethene (t-1,2,-DCE) . 1,1, 1-Trichloroethane (1,1,1-TCA), Trichloroethene (TCE) and Tetrachloroethene (PCE). As a result of this contamination, EPA prepared the ROD, dated June 4,





EPA'S RMA OFF-POST OUL
 SACWSD MUNICIPAL &
 MONITORING WELLS
 GMR, TRENKLE & WATTE, INC. FIG. 3
 06/13/99
 SACKWELL/DWG CDM

1987, and SACWSD entered into an agreement with the U.S. Environmental Protection Agency (EPA), the U.S. Army, and the Colorado Department of Health (CDH) to arrange for the funding and construction of a water treatment facility, now known as the Klein Water Treatment Facility (KWTF).

KWTF is located on land leased from the Army to SACWSD, within the RMA boundary. The 10-acre site is located approximately 600 feet east of Quebec Street with a northern boundary that is the quarter section line of Section 33, Township 2 South, Range 67 West. The address for the facility follows:

Klein Water Treatment Facility

P.O. Box 597

7400 Quebec Street

Commerce City, Colorado 80037-0597

Telephone (303) 286-0447

Fax (303) 288-9531

SITE HISTORY

SACWSD was created in 1953 to provide drinking water and sewage treatment to residents and businesses in Commerce City. SACWSD supplies its customers with water from wells completed in alluvium and bedrock. Until 1988, more than four hundred private supply wells were in use throughout the south Adams County area. Most of these wells tapped the alluvial aquifer.

EPA data showed that water from these wells exceeded Safe Drinking Water Act (SDWA) criteria for volatile organic compounds and posed a threat to public health. As part of a Removal Action conducted by EPA in 1986, all interested parties south of 80th Avenue with private drinking water wells were connected to the public water supply. A similar Removal Action was completed between 1987-1988 to connect those parties north of 80th Avenue to the public water supply.

Using a combination of EPA and Army funds, temporary carbon treatment systems at five public water supply wells were operated between 1986-1989. The temporary carbon treatment systems were designed to operate until the permanent treatment system, KWTF, was built. The temporary systems removed the VOCs from raw groundwater to levels below the SDWA's Maximum Contaminant Level (MCL). The treated water was then routed to the SACWSD distribution system. KWTF was completed November 7, 1989, and the temporary carbon treatment systems were subsequently dismantled.

Contaminated groundwater containing organic solvent compounds has been detected by various governmental entities, including EPA, intermittently since 1981 throughout EPA's RMA Off-Post OU1 in both residential and SACWSD supply wells. RNA, which received final listing on the National Priorities List (NPL) on July 1, 1987, was initially identified as one of two or more sources for

the groundwater contamination in south Adams County. Further studies resulted in the identification of Chemical Sales Company (CSC) as a potential contributor to the groundwater contamination. See the RODs for CSC OU1, and CSC OU2, both dated June 27, 1991 for information on groundwater remediation activities.

The ROD for EPA's RMA Off-Post OU1, dated June 4, 1987, selected a granular activated carbon (GAC) treatment system and regeneration of spent carbon as the remedial action of choice for protecting the drinking water supply. As mentioned above, CSC OU2 addresses remediation of the aquifer itself. Several alternatives were evaluated for cost and effectiveness in achieving the desired human health protection, implementability of the alternatives, permanency resulting in a permanent and significant decrease in toxicity, mobility and volume of the hazardous substance, institutional considerations, and adverse impacts. As stated earlier, the cleanup goal for EPA's RMA Off-Post OU1 is to treat contaminated groundwater to SDWA standards. The cleanup goals for CSC OU1 and CSC OU2 are to remediate the contaminated groundwater.

The GAC system was selected to treat contaminated water from SACWSD drinking water supply wells prior to its consumption as drinking water. The GAC system was designed to remove the hazardous substances of primary concern (volatile organic chemicals) from the drinking water to levels which assure protection of human health, and attain applicable or relevant and appropriate requirements (ARARs).

KLEIN WATER TREATMENT FACILITY

A brief description of the Klein Water Treatment Facility (KWTF) follows. Additional information about the facility can be obtained in the Operations and Maintenance Plan, prepared in 1989 by Black & Veatch (the facility's designers), and individual operation and maintenance manuals on file at KWTF. KWTF was completed November 7, 1989, as the remedial action alternative selected in the ROD of June 4, 1987. Construction was completed within the \$10,906,344 budget received through EPA and DOA funding.

Six shallow wells, numbered 2, 3, 5, 14, 16, and 17, ranging in depth from 80 to 100 feet, provide raw water for KWTF. The water from the wells is pumped directly to KWTF, without the need for an intermediate pumping station. Figure 3 shows the location of the six shallow SACWSD supply wells.

The treatment system at KWTF consists of granular activated carbon (GAC) pressurized contactors. See Figure 4 for a schematic diagram of KWTF. There are a total of 18 contactors, each containing 20,000 pounds of granular activated carbon. Up

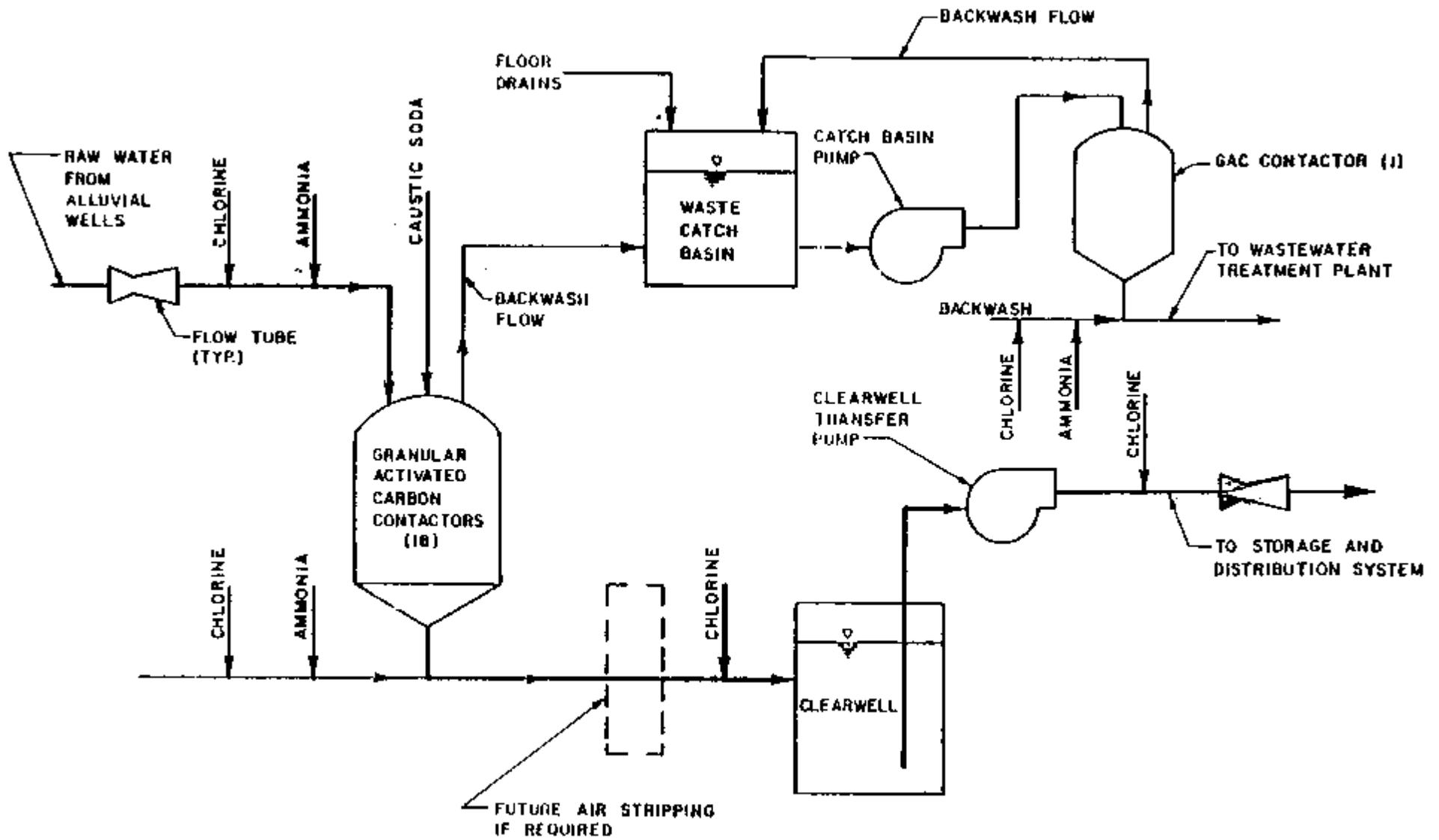


FIGURE 4
 KLEIN WATER TREATMENT
 FACILITY SCHEMATIC

to 16 contactors may be on-line at one time, giving the facility a 12 million gallon per day treatment capability. Table 1 gives a breakdown of KWTF's major components. Pressurized water enters the contactors from the top and then flows downward through the carbon. As the water comes into contact with the carbon, the volatile organic chemicals (VOCs) in the water are adsorbed to the highly porous surface of the carbon.

When the carbon in a contactor is saturated with contaminants, the contactor is taken off-line and the carbon is replaced with virgin carbon. The spent carbon is hauled back to the supplier's manufacturing facilities and given a high-heat treatment called thermal regeneration. Thermal regeneration drives off and destroys any organic compounds on the carbon, allowing the carbon to be reused at a later date.

Table 1

Klein Water Treatment Facility Major Components*

Flowmeter, mgd	
Influent range	0-16
Effluent range	0-13
GAC Contactors	
Number of units	18
On-line	0-16
Reserve	2
Maximum loading rate, gpm/sq ft	
Parallel operation	6.6
Series operation	13.2
Carbon capacity, lb	20,000
Clearwell	
Capacity, gal	300,000
Transfer pumps	
Number	6
Capacity	1,667 gpm at 165 ft
Waste Catch Basin	
Capacity, gal	110,000
Pumps	
Number	2
Capacity	100 gpm at 65 ft
GAC contactor	
Number	1
Max loading rate, gpm/sq ft	6.6
Carbon capacity, lb	10,000

Table 1 (Continued)

Klein Water Treatment Facility Major Components

Chlorine

Storage	Ton containers
Number	8
Feeders	
Number	3
Capacity, lbs/day	
Influent	1,000
Backwash/Standby	1,000
Effluent	500

Ammonia

Storage	Tank
Capacity, gal	5,000
Pumps	
Number	3
Capacity	
Treatment process	0.65 to 14.8 gph
Test column	0.006 to 0.25 gph

Sodium Hydroxide (Caustic Soda)

Storage	Stainless steel tank
Capacity, gal	10,000
Stainless steel batch tank	
Number	1
Capacity, gal	7,600
Transfer pumps	
Number	2
Rating	70 gpm at 22 ft

* KWTF Operations and Maintenance Plan, Black & Veatch

A chemical feed system is in place at KWTF to store the chemicals that are used in the water treatment process and deliver the chemicals to different locations throughout the facility. The chemicals that are used at KWTF are chlorine, ammonia, and sodium hydroxide (caustic soda). Chlorine is added to disinfect the water before it is distributed. Chlorine and ammonia are combined to form chloramines which acts to disinfect the contactors. Caustic soda is used to sterilize both the virgin carbon and contactors.

Once the water has been treated, it is transferred to the storage and distribution system. The treated water is then suitable for use by SACWSD customers.

III. REMEDIAL ACTION OBJECTIVES

The granular activated carbon (GAC) treatment facility was selected and designed to treat contaminated groundwater underlying EPA's RMA Off-Post OUI as a cost-effective remedial action, protective of human health, and consistent with possible future remedial actions. The remedial action was consistent with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and the National Contingency Plan, 40 CFR Part 300. The ROD provided for, and the remedial action was designed to include the possible addition of an air stripper in the event that vinyl chloride, which has been identified upgradient of the SACWSD wells, poses a threat to human health. The selected remedy provided for the replacement of existing well pumps and motors, the installation of transmission piping, and the construction of laboratory and office space. To assure protection of the public health in the interim period between approval of the Record of Decision (ROD) and completion of the selected permanent GAC treatment system (KWTF), the selected remedy provided for the continuing operation of the temporary GAC treatment system.

The GAC treatment system was selected to utilize permanent solutions and treatment technologies to the maximum extent practicable for contaminants identified in SACWSD drinking water supply wells. "The selected remedy for this operable unit will reduce the volume and the toxicity and mobility of contaminants identified in south Adams County drinking water to date, through the incineration of the volatile organic compounds adsorbed on the granular activated carbon when the carbon is regenerated. Spent carbon from the GAC treatment system will be regenerated at an incinerator in compliance with Sections 3004 and 3005 of the Solid Waste Disposal Act (SWDA) and Section 121(d) (3) of CERCLA" (ROD Summary, pg 4).

EPA selected Maximum Contaminant Levels (MCLs) as the applicable or relevant and appropriate requirements (ARARs) which the selected remedy must at least attain for this operable unit. According to the ROD of June 4, 1987, (pg 19) "Specifically, the selected remedy shall at least attain, and shall in no circumstances exceed, the following levels for hazardous substances, pollutants or contaminants identified in south Adams County drinking water: (1) proposed MCLs for volatile synthetic organic chemicals. See 50 Fed. Reg. 46902 (Nov. 13, 1985); and (2) final MCLs. In the event that MCLs are revised, or amended to include additional contaminants identified in south Adams County drinking water, the agency will evaluate such revised or amended MCLs and amend the Record of Decision, if appropriate, to require that the remedy attain the revised or amended MCLs and assure adequate protection of human health." See Table 2 for proposed MCLs and advisory standards used in the ROD, and Table 3

for MCLs finalized after the signing of the ROD.

The GAC treatment system was selected to attain a level of control for contaminants that falls within a total risk range of 10^{-4} to 10^{-7} over a 70-year lifetime exposure, with a goal of attaining a level of control that reflects a 10^{-6} risk. A risk of 10^{-4} signifies one additional cancer death per 10,000 people over a 70 year lifetime exposure, 10^{-7} signifies one additional cancer death per 10,000,000 people over a 70 year lifetime exposure, and 10^{-6} signifies one additional cancer death per 1,000,000 people over a 70 year lifetime exposure.

IV. REVIEW OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

As stated in the ROD, the RI/FS for EPA's OUI was initiated on October 2, 1985, prior to the enactment of SARA. In accordance with the current EPA policy at the time of commencement of the RI/FS, the Region considered Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act (SDWA) as the applicable or relevant and appropriate requirements (ARARS) for this operable unit. In the finalization of the ROD, EPA determined that the ARARS for this operable unit are the MCLs established under the SDWA for hazardous substances, pollutants, or contaminants identified in south Adams County drinking water.

Table 2

Standard/Advisory for the Chemicals of Concern as Shown in the ROD for First Operable Unit, RMA Off-Post RI/FS Site, June 4, 1987

Volatile Organic Chemicals	mg/l
Trichloroethene (TCE)	0.005 ⁽¹⁾
¹ ,2-Dichloroethane (1,2-DCA)	0.005 ⁽¹⁾
1,1,1-Trichloroethane (1,1,1-TCA)	0.200 ⁽¹⁾
1,1-Dichloroethene (1,1-DCE)	0.007 ⁽¹⁾
trans-1,2-Dichloroethene (t-1,2-DCE)	0.070 ⁽²⁾
Tetrachloroethene (PCE)	0.0007 ⁽³⁾

- (1) Proposed MCLs for Volatile Synthetic Organic Chemicals, 50 Federal Register 46092 (November 13, 1985).
- (2) No MCL or proposed MCL, EPA Health Advisory Level for lifetime exposure shown.
- (3) No MCL or proposed MCL, reference concentration for potential carcinogens at 10^{-6} risk level shown.

Table 3

Finalized MCLs in the National Primary Drinking Water Regulations.

<u>Volatile Organic Chemicals</u>	<u>mg/l</u>
Trichloroethene (TCE)	0.005 ⁽¹⁾
1,2-Dichloroethane (1,2-DCA)	0.005 ⁽¹⁾
1,1,1-Trichloroethane (1,1,1-TCA)	0.200 ⁽¹⁾
1,1-Dichloroethene (1,1-DCE)	0.007 ⁽¹⁾
trans-1,2-Dichloroethene (t-1,2-DCE)	0.100 ⁽²⁾
Tetrachloroethene (PCE)	0.005 ⁽²⁾

- (1) 52 Federal Register 25690 (July 8, 1987), effective January 9, 1989.
- (2) 56 Federal Register 3526 (January 30, 1991), effective July 30, 1992.

At the time of ROD completion, June 4, 1987, four of the contaminants of concern, Trichloroethene (TCE), 1,2-Dichloroethane (1,2-DCA), 1,1,1-Trichloroethane (1,1,1-TCA), and 1,1-Dichloroethene (1,1-DCE) had proposed MCLs, trans-1,2-Dichloroethene (t-1,2-DCE) was listed at the Health Advisory Level, and Tetrachloroethene (PCE) was listed at the reference concentration for potential carcinogens, see Table 2. The MCLs for all of the original contaminants of concern have since become finalized in the National Primary Drinking Water Regulations, see Table 3. The contaminants shown in Table 2 as having proposed MCLs, were finalized at the identical level of concentration as the proposed level, i.e., the finalized MCLs remained the same as the proposed MCLs. The GAC system at KWTF is effective at removing the VOCs present to the proposed MCLs, therefore, the finalization of the proposed MCLs into the National Drinking Water Regulations has had no effect on the facility's removal capabilities, or protection of human health.

Since the ROD signing, there has been great improvements in VOC detection and evaluation technology. Due to this improved technology, it has become possible to detect cis-1,2-Dichloroethene (c-1,2-DCE) , and differentiate it from t-1,2-DCE. During the study phase of the RI/FS, it was only possible to detect t-1,2-DCE. It has since been determined that c-1,2-DCE is present in small quantities in SACWSD supply wells. The gas chromatography/mass spectrometry (GC/MS) laboratory at KWTF presently monitors for both t-1,2-DCE and c-1,2-DCE. The MCL for c-1,2-DCE is .07 mg/l, see Table 4. As shown in Appendix C and D, the levels for c-1,2-DCE are well below MCLs. The ability to

monitor for c-1,2-DCE increases the facility's protectiveness of human health through the full use of current evaluation technology.

The finalization of MCLs for t-1,2-DCE and PCE on January 30, 1991 has not deterred from KWTF's capacity to provide clean water to the public. The granular activated carbon (GAC) treatment system is very effective at removing both t-1,2-DCE and PCE. GAC is considered one of the best available technologies (BAT) for the removal of VOCs present in SACWSD supply wells. KWTF has been removing t-1,2-DCE and PCE to their respective proposed MCLs, even prior to finalization. Therefore, the finalization of MCLs for t-1,2-DCE and PCE does not deter from the effectiveness of the facility. As documented in Appendix E, KWTF Effluent Monitoring Data, KWTF is providing clean drinking water to the public.

Neither State nor Local regulations have been promulgated or modified since the ROD completion, which may have a potential impact on the effectiveness of the remedial action. Letters from Colorado Department of Health, Hazardous Materials and Waste Management Division, and Commerce City, Code Administration, confirm that there has been no regulatory changes effecting the protectiveness of the facility. These confirmation letters appear in Appendix B.

V. SUMMARY OF SITE VISIT

The Klein Water Treatment Facility (KWTF) was visited by EPA for the purposes of the five-year review on December 5, 1991, and again on December 12, 1991. The general impression obtained from visiting KWTF is one of a well designed, well maintained, modern and efficient operation. Through the five-year review evaluation process, it has been determined that each component of the remedy is operating in accordance with its intended function, and remains protective of human health and the environment. A brief summary of the various components follows.

Plant Operations

Daily plant operation at KWTF is very similar to that projected in the Operations and Maintenance Plan for the facility. As discussed in the following section, Plant Maintenance, the facility is well designed and maintained, allowing daily operations to run smoothly.

Plant Maintenance

Facility maintenance (other than carbon change-out) and routine repairs at KWTF have been at the frequency projected by Black & Veatch. The minimal amount of repair and maintenance required at

KWTF are representative of the operational efficiency of the facility. Weekly maintenance reports are available at KWTF.

At the time of this five-year review, the contactors at KWTF contained the original carbon from plant start-up. The carbon is expected to remain effective for approximately two years of continuous use. As breakthrough occurs (the failure of carbon to adsorb additional contaminants), the carbon will be replaced with virgin carbon. The first carbon change-out is expected to take place in March of 1992.

The rate of carbon usage is slightly less than that projected by KWTF designers, Black & Veatch. Black & Veatch anticipated that contactors would require a carbon change-out after approximately two full years of operation. The scheduled carbon change-out in March of 1992 will be after approximately two years and four months of continuous operation. A slower than predicted contaminant loading has resulted in this reduced rate of carbon-usage. The reduced rate of contaminant loading is due to two factors: 1) a slight lowering of groundwater contaminant levels since plant start-up, and 2) the above-average precipitation in 1991, reducing municipal water needs and subsequent facility output.

The carbon change-out is contracted with Calgon Carbon Corporation, based in Pennsylvania. Calgon Carbon Corporation will deliver the virgin carbon to KWTF, assist in carbon transfer into KWTF, load the contaminated carbon into a truck, haul it back to the manufacturing facility in Pennsylvania, and thermally regenerate the carbon.

At the startup of KWTF, the spent carbon was considered to be an EPA hazardous waste, list # F002. On February 7, 1992, Colorado Department of Health (CDH) granted a petition by SACWSD for a conditional delisting of the waste as hazardous. The delisting approval by CDH enables SACWSD to regenerate the contaminated carbon, now classified as nonhazardous, at considerable cost savings.

CDH determined that the spent carbon probably does not pose a significant short term hazard either through exposure during transit, or through occupational handling. The conditions of the spent carbon delisting include a land disposal restriction, and a requirement that the carbon be thermally regenerated as stated in the ROD.

Groundwater Monitoring

A) Supply Wells

The six SACWSD supply wells are monitored quarterly for the constituents in Table 4, in order to document the water quality from each contributing well and to assist in the decision making regarding what combinations of wells to pump. A summary of well monitoring data appears in Appendix C. Supply wells which are in use providing groundwater to KWTF (termed on-line), are monitored weekly for the compounds in Table 5. It should be noted that supply wells are put on-line as needed, therefore, the wells are generally not all in operation at the same time. The results of quarterly monitoring at supply wells for the compounds in Table 4 are available at KWTF.

Table 4

National Primary Drinking Water Regulations

Regulated Compounds

<u>Parameter</u>	<u>MCL</u> (mg/l)
Benzene	0.005
Carbon tetrachloride	0.005
1,2-Dichlorobenzene	0.6
1,4-Dichlorobenzene	0.075
1,2-Dichloroethane	0.005
1,1-Dichloroethene	0.007
cis-1,2-Dichloroethene	0.07
trans-1,2-Dichloroethene	0.1
1,2-Dichloropropane	0.005
Ethylbenzene	0.7
Chlorobenzene	0.1
Styrene	0.1
Tetrachloroethene	0.005
Toluene	1.0
1,1,1-Trichloroethane	0.2
Trichloroethene	0.005
Vinyl chloride	0.002
Xylenes (total)	10.0
Ethylene dibromide	0.00005
1,2-Dibromo-3-chloropropane	0.0002

Table 4 (Continued)

Unregulated Compounds

Bromobenzene	2,2-Dichloropropane
Bromochloromethane	1,1-Dichloro-1-propene
Bromodichloromethane	cis-1,3-Dichloropropene
Bromoform	trans-1,3-Dichloropropene
Bromomethane	Hexachlorobutadiene
n-Butylbenzene	Isopropylbenzene
sec-Butylbenzene	4-Isopropyltoluene
tert-Butylbenzene	Methylene chloride
Chloroethane	Napthalene
Chloroform	n-Propylbenzene
Chloromethane	1,1,1,2-Tetrachloroethane
2-Chlorotoluene	1,1,2,2-Tetrachloroethane
4-Chlorotoluene	1,2,3-Trichlorobenzene
Dibromochloromethane	1,2,4-Trichlorobenzene

Unregulated Compounds

Dibromomethane	1,1,2-Trichloroethane
1,3-Dichlorobenzene	Trichloroflouromethane
Dichlorobromomethane	1,2,3-Trichloropropane
Dichlorodiflouromethane	1,2,4-Trimethylbenzene
1,1-Dichloroethane	1,3,5-Trimethylbenzene
1,3-Dichloropropane	

Table 5

Supply Well Monitoring - Conducted Weekly (when on-line)

1,1-Dichloroethene (1,1-DCE)
1,1-Dichloroethane (1,1-DCA)
cis-1,2-Dichloroethene (c-1,2-DCE)
1,1,1-Trichloroethane (1,1,1-TCA)
Trichloroethene (TCE)
Tetrachloroethene (PCE)
Trichloroflouromethane (TCFM) ¹
Vinyl Chloride (VC) ¹
Chloroethane (CE) ¹

¹ Monitoring for TCFM, VC, and CE started at different dates for each of the six supply wells. See Appendix C for actual dates and monitoring results.

B) Monitor Wells

Monitor wells are used throughout the SACWSD area in order to track contamination trends. The location of monitor wells are shown in Figure 3. All of the 9 monitor wells south of 80th Avenue and 4 monitor wells north of 80th Avenue are tested quarterly for compounds in Table 4. Test data from the SACWSD monitoring wells is available from KWTF.

Influent Monitoring

The influent raw water line is monitored weekly for compounds in Table 6, to determine the quality of the raw groundwater entering the facility. A summary of the KWTF influent data appearing in Appendix D indicates which wells were on-line at each testing date. The results of quarterly monitoring at the KWTF influent line for the compounds in Table 4 are available at KWTF.

Table 6

Influent Monitoring - Conducted Weekly

1,1-Dichloroethene (1,1-DCE)
1,1-Dichloroethane (1,1-DCA)
cis-1,2-Dichloroethene (c-1,2-DCE)
1,1,1-Trichloroethane (1,1,1-TCA)
Trichloroethene (TCE)
Tetrachloroethene (PCE)
Trichlorofluoromethane (TCFM) ¹
Vinyl Chloride (VC) ²
Chloroethane (CE) ³

¹ TCFM monitoring began March 11, 1991, and is ongoing.

² VC monitoring began April 22, 1991, and ended August 6, 1991.

³ CE monitoring began August 12, 1991, and is ongoing.

Effluent Monitoring

KWTF contributes water directly to the SACWSD distribution system requiring the treated water (effluent) to be subject to Colorado Department of Health, (CDH) and Safe Drinking Water Act (SDWA) regulations. Therefore, the plant effluent is monitored on a quarterly basis for the current SDWA requirements in Table 4.

Various points in the water treatment and storage process are monitored for contaminants. These points include each contactor, plant effluent, and each reservoir. The purpose of this testing is two-fold: 1) to monitor the water quality coming out of each

contactor or group of contactors so the different streams of water can be blended to provide a final product in compliance with all MCLs, and 2) to document the organic loading on each contactor.

At the time of this five-year review, the contactors at KWTF still contained the original carbon from plant start-up. As breakthrough occurs, the effluent from a parallel configuration of contactors is monitored to track carbon usage and monitor water blending operations. In addition, as breakthrough occurs, the effluent from each individual contactor is monitored weekly for compounds in Table 7, to aid in decisions regarding contactor configuration and carbon change-out.

KWTF effluent monitoring is conducted weekly for compounds listed in Table 8. Appendix E contains the monitoring data for KWTF effluent. Reservoir monitoring is also conducted weekly for compounds listed in Table 9. Appendix F contains monitoring data for each of the three SACWSD reservoirs storing KWTF treated water.

Table 7

Contactors Monitoring - Conducted Weekly (during breakthrough)

1,1-Dichloroethene (1,1-DCE)
1,1-Dichloroethane (1,1-DCA)
cis-1,2-Dichloroethene (c-1,2-DCE)
1,1,1-Trichloroethane (1,1,1-TCA)
Trichloroethene (TCE)
Tetrachloroethene (PCE)
Trichlorofluoromethane (TCFM)

Table 8

Effluent Monitoring - Conducted Weekly

1,1-Dichloroethene (1,1-DCE)
1,1-Dichloroethane (1,1-DCA)
cis-1,2-Dichloroethene (c-1,2-DCE)
1,1,1-Trichloroethane (1,1,1-TCA)
Trichloroethene (TCE)
Tetrachloroethene (PCE)
Trichlorofluoromethane (TCFM) ¹
Vinyl Chloride (VC) ²
Chloroethane (CE) ³
Chloroform ⁴
Bromoform ⁴
Dibromochloromethane (DBCM) ⁴
Dichlorobromomethane (DCBM) ⁴

¹ TCFM monitoring began February 19, 1991, and is ongoing.

² VC monitoring began February 19, 1991, and ended August 6, 1991.

³ CE monitoring began August 12, 1991, and is ongoing.

⁴ Chloroform, Bromoform, DBCM, and DCBM monitoring began November 19, 1990.

Table 9

Reservoir Monitoring - Conducted Weekly

1,1-Dichloroethene (1,1-DCE)
1,1-Dichloroethane (1,1-DCA)
cis-1,2-Dichloroethene (c-1,2-DCE)
1,1,1-Trichloroethane (1,1,1-TCA)
Trichloroethene (TCE)
Tetrachloroethene (PCE)
Trichlorofluoromethane (TCFM) ¹
Vinyl Chloride (VC) ^{1,2}
Chloroethane (CE) ^{1,2,3}
Chloroform ¹
Bromoform ¹
Dibromochloromethane (DBCM) ¹
Dichlorobromomethane (DCBM) ¹

¹ Monitoring for TCFM, VC, CE, Chloroform, Bromoform, DBCM, and DCBM began March 19, 1990, and except for VC, is ongoing.

² VC monitoring ended August 5, 1991.

³ CE monitoring began August 12, 1991, and is ongoing.

Operation and Maintenance Budget

Current operation and maintenance (O & M) funding for KWTF is obtained from a \$ 6 million fund set up under the Superfund State/Political Subdivision Agreement (SS/PSA) between EPA, Army, State of Colorado, and South Adams County Water and Sanitation District (SACWSD). The parties anticipated that the \$ 6 million would be sufficient to provide for the funding of O & M expenses for the permanent system (KWTF) for twenty-five years.

In 1989, Black & Veatch prepared the Operations and Maintenance Plan for the Klein Water Treatment Facility (KWTF). The O & M Plan recognized that the \$ 6 million fund would be exhausted before the end of the twenty-five year period. Management at KWTF currently estimates that the \$ 6 million fund will last approximately eighteen years, until the year 2007.

The projected costs, as estimated in the O & M Plan, and actual O & M expenses are given in Appendix F. A brief comparison of the projected and actual expenses are shown in Table 10.

Table 10

Comparison Summary of Projected and Actual O & M Costs.

YEAR	PROJECTED COSTS	ACTUAL COSTS	SUNDER
1989	\$292,488	\$153,098	\$(139,390)
1990	\$572,630	\$471,265	\$(101,365)
1991	\$597,915	\$444,728	\$(153,187)
		TOTAL	\$(493,842)

At the end of 1991, KWTF was operating \$493,842 below the costs projected by Black & Veatch. The lower expenses are due to a delayed start-up in 1989, and a full carbon change-out to occur in 1992 instead of in 1991, as projected. Additionally, the lower O & M expenses are due to less expensive service contracts obtained through local, instead of national contractors.

O & M costs can be indicative of how well the remedial action is operating as compared to what was anticipated in project planning. The lower than expected operating expenditures at KWTF are indicative of the facility's reliability and management efficiency.

Appendix G includes an expense projection for 1992, as estimated by management at KWTF. The carbon change-out costs are currently estimated to be significantly less than the costs projected by

Black & Veatch, due to a less expensive carbon change-out contract. Black & Veatch used a carbon cost of \$1.00 per pound in their 1989 calculations. KWTF has since obtained a contract for the identical carbon service at \$0.888 per pound.

Duration of Operation and Maintenance Activities

When the aquifer is no longer contaminated in excess of the MCLs or other applicable standards, and it has been determined that the groundwater is safe for drinking without treatment, SACWSD will contact Colorado Department of Health (CDH) and EPA for approval to stop granular activated carbon (GAC) treatment. At this time, contaminants are still being detected in the groundwater. It is not known how long treatment will be required.

VI. NONCOMPLIANCE

According to the Klein Water Systems Manager, James Jones, there has not been a single instance of SDWA or CDH noncompliance in the operating history of KWTF. Effluent monitoring data which support this statement appear in Appendix E. More detailed quarterly monitoring data can be obtained from KWTF.

VII. RECOMMENDATIONS/TECHNOLOGY

On the basis of this five-year review, it has been determined that no additional response action, modification of the remedy, or new remedy, pursuant to the National Contingency Plan (NCP) section 300.435 (c)(2), is required. This recommendation is based upon the various aspects contributing to the high level of protectiveness provided by the remedy. These contributing factors are discussed in Part VIII below.

The granular activated carbon (GAC) treatment system is one of several best available technologies (BAT) for the removal of synthetic organic contaminants (see 56 Federal Register 3526, January 30, 1991). As a result of this designation, the GAC treatment system remains a current and effective technology.

The remedial action was designed to include the possible addition of an air stripper, in the event that vinyl chloride, which has been identified upgradient of SACWSD supply wells, poses a threat to human health. Vinyl chloride has not yet been detected in any of the six SACWSD supply wells, eliminating the need, at present, for the addition of an air stripper.

VIII. PROTECTIVENESS

Through the five-year review evaluation process, it has been determined that each component of the remedy is operating in accordance with its intended function, and remains protective of human health and the environment. KWTF is operating as designed, under the projected O & M budget, and has never had a violation of either SDWA or CDH regulations.

Neither State nor Local regulations have been promulgated or modified since the ROD completion, which may have a potential impact on the effectiveness of the remedial action. As discussed in the applicable or relevant and appropriate requirements (ARARs) review (Part IV of this review), several compounds have had MCLs finalized since the signing of the ROD. The finalization of MCLs has in no way negatively affected the protectiveness of the remedial action. The finalization of MCLs has given additional enforcement authority to EPA. The finalization of MCLs has ensured the public of a high level of protection.

IX. NEXT FIVE-YEAR REVIEW

The remedial action for EPA's RMA Off-Post OUI was initiated July 1, 1987, requiring this five-year review to be complete by the end of fiscal year 1992, i.e., September 31, 1992. The next Level I, five-year review will need to be completed by the end of fiscal year 1997, i.e., September 31, 1997.

Appendix A

List of Acronyms

ARAR	applicable or relevant and appropriate requirement
BAT	best available technologies
CDH	Colorado Department of Health
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DOA	U.S. Department of Army
EPA	U.S. Environmental Protection Agency
GAC	granular activated carbon
KWTF	Klein Water Treatment Facility
MCL	maximum contaminant level
NPL	National Priority List
O & M	operations and maintenance
OU	Operable Unit
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
RMA	Rocky Mountain Arsenal
ROD	Record of Decision
SACWSD	South Adams Water and Sanitation District
SARA	Superfund Amendments and Authorization Act
SDWA	Safe Drinking Water Act
SS/PSA	Superfund State/Political Subdivision Agreement
SWDA	Solid Waste Disposal Act
VOC	Volatile Organic Chemical

Appendix B

State and Local Government Letters Regarding
Applicable or Relevant and Appropriate Requirements.



4210 East 11th Avenue
Denver, Colorado 80220-3716
Phone (303) 320-8333

Telefax Numbers:
Main Building/Denver
(303) 322-9076

Ptarmigan Place/Denver
(303) 320-1529

First National Bank Building/Denver
(303) 355-6559

Grand Junction Office
(303) 248-7198

Pueblo Office
(719) 543-8441

ROY ROMER
Governor

JOEL KOHN
Interim Executive Director

December 20, 1991

Mr. Bryan Dunn
Superfund Remedial Action Branch
Hazardous Waste Management Division
Region VIII, Mail code: 8HWM-SR
United States Environmental Protection Agency
999-17th Street, Suite 500
Denver, CO 80202-2405

RE: Klein Water Treatment Plant - Five Year Review:
Water Quality Standards Update

Dear Mr. Dunn:

As per your request, I have reviewed the State Water Quality Standards including the Colorado Primary and Secondary Drinking Water Standards. I do not find any changes in the Standards or Regulations which would impact the current operations at the Klein Water Treatment Plant. I am enclosing a copy of the tabled ground-water standards, column 2, and any changes in the Statewide Standards denoted with a (p).

If you have any questions regarding specific standards or regulations, please feel free to contact me at 331-4433.

Sincerely,

James D. Lewis
Hydrogeologist
Hazardous Materials
and Waste Management Division
Remedial Programs Section

Attachment

Department of
Community Development

January 6, 1992

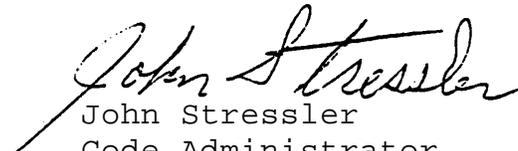
Brian Pinkowski
Environmental Protection Agency
Region 8 (8 HWM-SR)
999 - 18th St., Ste. 500
Denver, CO 80202-2466

Dear Brian:

Please be advised that per our conversation of January 3, 1992, Commerce City has not passed any local ordinance that would effect the environmental integrity of the Klein Water Treatment Facility.

Please contact me if you require additional information.

Sincerely,


John Stressler
Code Administrator

Appendix C South Adams County Water and Sanitation District
Shallow Supply Well Monitoring Data. ¹

- 1 Monitoring data appearing in the Appendix is dated at the earliest, February 12, 1990. This is the date at which the laboratory at Klein Water Treatment Facility began operation.
- 2 The time frame varies for the testing of each well due to normal operational changes at KWTF (i.e., which wells on-line, and the number of contactors on-line).

South Adams County Water
And Sanitation District
Klein Water Treatment Facility
7400 Quebec Street
P.O. Box 597
Commerce City, CO 80037-0597

WELL 2

DATE COLLECTED	1,1 DCE	1,1 DCA	C-1,2 DCE	1,1,1 TCA	TCE	PCE	TCFM	VC
09-Mar-90	2.4	BDL	BDL	4.7	5.2	BDL	ND	ND
09-Mar-90 (1)	3	BDL	BDL	5	4	BDL	BDL	BDL
10-May-90	3.3	BDL	BDL	6.1	6.8	1.1	ND	ND
10-May-90 (2)	2	BDL	BDL	5	5	BDL	BDL	BDL
31-Jul-90	3.2	6.1	8.6	7.2	28	9.9	ND	ND
06-Aug-90	2.4	4.9	6.4	5.2	28	7.2	ND	ND
13-Aug-90	2.8	5.0	6.8	6.6	29	9.2	ND	ND
17-Aug-90 (3)	3.1	4.6	6.5	5.5	30	7.2	BDL	BDL
04-Sep-90	3.5	6.1	7.9	6.0	33	8.8	ND	ND
03-Oct-90 (4)	2.8	4.1	5.6	4.1	17	5.6	BDL	BDL
29-Nov-90	1.5	1.8	3.0	2.5	15	5.6	ND	ND
21-Jan-91	1.3	1.0	2.1	2.3	10	4.1	ND	ND
04-Feb-91	BDL	BDL	2.3	2.6	10	3.9	ND	ND
11-Feb-91	1.3	BDL	2.0	2.8	9.8	4.0	ND	ND
19-Feb-91 *	2.1	BDL	1.9	3.0	8.9	3.5	BDL	BDL
25-Feb-91	1.6	BDL	1.5	2.6	7.8	2.9	ND	ND
01-Mar-91	1.9	BDL	2.0	3.2	9.3	3.5	ND	ND
11-Mar-91	2.0	BDL	1.7	3.2	8.5	3.4	BDL	ND
20-Mar-91 *	2.1	BDL	1.7	3.4	9.0	3.4	BDL	ND
25-Mar-91	1.9	BDL	1.6	3.3	8.2	3.3	BDL	ND
01-Apr-91	2.0	BDL	1.7	3.2	8.2	3.0	BDL	ND
08-Apr-91	2.3	1.0	2.1	3.9	11	4.2	BDL	ND
15-Apr-91 *	2.6	BDL	1.8	4.0	9.8	3.8	BDL	BDL
13-May-91	2.2	1.0	2.3	3.4	10	4.3	BDL	BDL
21-May-91	2.4	1.2	2.6	4.5	13	5.4	BDL	ND
17-Jun-91	1.4	1.8	3.4	4.7	18	7.6	BDL	BDL
01-Jul-91	2.2	1.9	3.6	4.2	18	8.0	1.3	BDL
08-Jul-91	2.1	1.9	4.1	4.0	19	7.1	1.5	BDL
11-Jul-91	2.2	2.2	4.7	4.3	22	8.5	1.8	BDL
15-Jul-91	2.1	2.1	4.6	4.1	21	8.6	2.0	BDL
24-Jul-91 *	2.2	2.0	4.0	3.6	20	7.8	2.5	BDL
01-Aug-91 ^	2.2	2.3	5.0	4.4	24	9.1	2.7	BDL
16-Sep-91	2.1	2.4	5.1	4.1	24	6.6	3.0	BDL
20-Sep-91	2.3	2.7	5.2	4.1	24	BDL	2.3	BDL
28-Oct-91	2.7	3.2	6.2	4.8	27	7.4	3.1	BDL
31-Oct-91 *	3.2	3.2	6.0	4.5	27	9.4	5.1	BDL
25-Nov-91	2.1	2.5	5.2	3.8	22	8.4	2.5	BDL

QUARTERLY SAMPLING

COMMENTS:

Units of concentration in ppb
Below detection level (BDL) = < 1 ppb
ND = Not Done
^ No longer testing for VC, Now CE

(1) 1st Quarter 1990 - Acculab Research
(2) 2nd Quarter 1990 - Cenref Lab
(3) 3rd Quarter 1990 - KWTF Lab
(4) 4th Quarter 1990 - KWTF Lab
* 1991 Quarterly Sample - KWTF Lab

South Adams County Water
 And Sanitation District
 Klein Water Treatment Facility
 7400 Quebec Street
 P.O. Box 597
 Commerce City, CO 80037-0597

WELL 5 (1)

DATE COLLECTED	1,1 DCE	1,1 DCA	C-1,2 DCE	1,1,1 TCA	TCE	PCE	TCFM	VC
10-May-90	BDL	BDL	BDL	BDL	3.2	2.9	ND	ND
10-May-90 (2)	BDL	BDL	1	BDL	3	2	BDL	BDL
31-Jul-90	BDL	BDL	1.5	BDL	4.2	3.6	ND	ND
06-Aug-90	BDL	BDL	1.1	1.0	4.0	2.6	ND	ND
13-Aug-90	2.6	BDL	1.2	6.0	10	2.6	ND	ND
17-Aug-90 (3)	2.2	BDL	1.0	3.9	7.0	1.9	BDL	BDL
04-Sep-90	2.2	BDL	1.8	3.3	9.1	3.2	ND	ND
03-Oct-90 (4)	BDL	BDL	1.0	BDL	2.7	2.5	BDL	BDL
17-Dec-90	2.2	BDL	BDL	3.5	5.2	1.7	ND	ND
21-Jan-91	BDL	BDL	BDL	BDL	1.9	2.2	ND	ND
04-Feb-91	BDL	BDL	BDL	BDL	2.0	2.0	ND	ND
11-Feb-91	BDL	BDL	BDL	BDL	2.0	2.4	ND	ND
19-Feb-91 *	BDL	BDL	BDL	BDL	2.0	2.6	BDL	BDL
26-Feb-91	BDL	BDL	BDL	BDL	2.0	2.4	ND	ND
08-Mar-91	BDL	BDL	BDL	BDL	1.8	2.4	BDL	ND
18-Mar-91	BDL	BDL	BDL	BDL	1.9	2.4	BDL	ND
15-Apr-91 *	BDL	BDL	BDL	BDL	1.8	2.5	BDL	BDL
21-May-91	2.6	BDL	BDL	4.6	6.6	1.7	BDL	BDL
17-Jun-91	2.1	BDL	1.0	4.0	6.7	1.9	BDL	BDL
24-Jun-91	2.1	BDL	1.2	4.2	7.4	2.3	BDL	BDL
01-Jul-91	1.4	BDL	1.1	2.4	5.5	2.7	BDL	BDL
08-Jul-91	1.3	BDL	1.1	2.4	5.4	2.4	BDL	BDL
11-Jul-91	1.8	BDL	1.2	3.5	7.2	2.5	BDL	BDL
18-Jul-91 *	BDL	BDL	BDL	BDL	1.7	2.0	BDL	BDL
07-Oct-91 ^	BDL	BDL	1.0	BDL	2.6	2.4	BDL	BDL
31-Oct-91 *	BDL	BDL	BDL	BDL	2.2	2.3	BDL	BDL
04-Nov-91	2.5	BDL	BDL	3.6	5.7	1.6	BDL	BDL
18-Nov-91	2.3	BDL	1.0	3.8	6.2	2.0	BDL	BDL

COMMENTS:

Units of concentration in ppb
 Below detection level (BDL) = < 1 ppb
 ND = Not Done
 ^ No longer testing for VC, Now CE

QUARTERLY SAMPLING

- (1) 1st Quarter 1990 - Acculab Research
- (2) 2nd Quarter 1990 - Cenref Lab
- (3) 3rd Quarter 1990 - KWTF Lab
- (4) 4th Quarter 1990 - KWTF Lab
- * 1991 Quarterly Sample - KWTF Lab

South Adams County Water
And Sanitation District
Klein Water Treatment Facility
7400 Quebec Street
P.O. Box 597
Commerce City, CO 80037-0597

WELL 14

DATE COLLECTED	1,1 DCE	1,1 DCA	C-1,2 DCE	1,1,1 TCA	TCE	PCE	TCFM	VC
20-Feb-90	BDL	BDL	BDL	BDL	7.4	30	ND	ND
20-Feb-90 (1)	BDL	BDL	BDL	BDL	6	25	BDL	BDL
09-Apr-90	BDL	BDL	BDL	BDL	9.1	46	ND	ND
10-May-90	BDL	BDL	BDL	BDL	6.3	25	ND	ND
01-Jun-90 (2)	BDL	BDL	BDL	BDL	7	27	BDL	BDL
06-Jul-90	BDL	BDL	1.7	1.0	7.5	17	ND	ND
31-Jul-90	BDL	1.2	2.3	1.3	9.2	23	ND	ND
06-Aug-90	BDL	1.2	2.2	1.3	8.6	20	ND	ND
13-Aug-90	BDL	BDL	1.2	BDL	8.8	34	ND	ND
17-Aug-90 (3)	BDL	BDL	1.6	1.0	8.3	22	BDL	BDL
04-Sep-90	BDL	1.4	2.7	1.4	10	25	ND	ND
03-Oct-90 (4)	BDL	1.0	1.8	1.1	7.4	18	BDL	BDL
05-Dec-90	1.1	1.4	2.7	1.5	9.5	21	ND	ND
17-Dec-90	BDL	BDL	BDL	BDL	8.8	46	ND	ND
21-Jan-91	1.0	1.2	2.6	1.4	9.0	19	ND	ND
04-Feb-91	BDL	1.3	2.7	1.6	9.0	18	ND	ND
11-Feb-91	BDL	1.1	2.7	1.7	9.5	22	ND	ND
19-Feb-91 *	1.5	1.5	3.2	2.1	10	21	3.2	BDL
25-Feb-91	BDL	1.1	2.6	1.6	8.0	15	ND	ND
01-Mar-91	1.2	1.3	3.3	2.0	9.9	18	ND	ND
11-Mar-91	1.0	1.2	2.8	1.9	9.1	17	2.3	ND
20-Mar-91	1.3	1.4	3.4	2.2	10	18	2.8	ND
25-Mar-91	1.2	1.3	3.4	2.2	9.8	17	2.8	ND
01-Apr-91	1.2	1.3	3.4	2.2	9.8	18	2.8	ND
04-Apr-91	1.1	1.3	3.2	2.2	9.9	17	2.8	ND
15-Apr-91 *	1.4	1.4	3.2	2.1	10	20	3.0	BDL
29-Apr-91	1.1	1.3	3.3	2.1	9.2	17	2.9	ND
06-May-91	1.0	1.1	2.7	1.7	8.8	21	1.9	BDL
21-May-91	1.0	1.3	3.1	2.0	9.0	16	2.1	BDL
17-Jun-91	BDL	BDL	1.4	BDL	8.2	28	BDL	BDL
24-Jun-91	BDL	BDL	1.3	BDL	9.1	33	BDL	BDL
11-Jul-91	BDL	BDL	1.5	BDL	8.0	25	BDL	BDL
15-Jul-91	BDL	1.1	2.0	1.2	7.9	20	BDL	BDL
24-Jul-91 *	BDL	BDL	1.4	BDL	6.8	24	BDL	BDL
19-Aug-91 ^	BDL	BDL	1.7	BDL	7.2	20	BDL	BDL
03-Sep-91	BDL	1.1	2.2	1.2	7.2	16	BDL	BDL
30-Sep-91	1.2	1.4	2.8	1.8	8.6	18	1.3	BDL
28-Oct-91	1.1	1.4	2.8	1.6	8.3	17	1.1	BDL

COMMENTS:

Units of concentration in ppb
Below detection level (BDL) = < 1 ppb
ND = Not Done
^ No longer testing for VC, Now CE

QUARTERLY SAMPLING

- (1) 1st Quarter 1990 - Acculab Research
- (2) 2nd Quarter 1990 - Cenref Lab
- (3) 3rd Quarter 1990 - KWTF Lab
- (4) 4th Quarter 1990 - KWTF Lab
- * 1991 Quarterly Sample - KWTF Lab

South Adams County Water
 And Sanitation District
 Klein Water Treatment Facility
 7400 Quebec Street
 P.O. Box 597
 Commerce City, CO 80037-0597

WELL 16 (1)

DATE COLLECTED	1,1 DCE	1,1 DCA	C-1,2 DCE	1,1,1 TCA	TCE	PCE	TCFM	VC
10-May-90	3.2	6.0	6.1	5.2	8.9	6.5	ND	ND
10-May-90 (2)	3	5	5	4	8	5	BDL	BDL
31-Jul-90	3.8	7.2	7.0	6.4	10	7.2	ND	ND
06-Aug-90	4.0	8.1	7.8	6.6	11	7.7	ND	ND
13-Aug-90	3.4	7.3	6.5	7.1	11	7.8	ND	ND
17-Aug-90 (3)	3.6	6.3	5.7	6.0	8.4	5.5	BDL	BDL
04-Sep-90	5.1	9.2	9.8	7.2	13	8.9	ND	ND
03-Oct-90 (4)	3.9	6.6	6.7	5.7	10	6.1	BDL	BDL
17-Dec-90	3.0	5.8	6.8	4.4	7.8	5.6	ND	ND
21-Jan-91	3.4	6.5	7.2	4.9	11	5.9	ND	ND
04-Feb-91	2.7	6.6	7.4	4.6	9.6	5.4	ND	ND
11-Feb-91	2.7	6.0	6.5	4.6	9.1	5.5	ND	ND
19-Feb-91 *(a) (b)	4.6	8.3	8.2	5.7	10	6.5	BDL	BDL
25-Feb-91	2.6	5.8	6.3	4.0	8.0	4.7	ND	ND
11-Mar-91	3.1	6.6	7.0	4.8	9.0	6.0	BDL	ND
20-Mar-91	2.8	6.7	6.8	4.4	9.6	5.2	BDL	ND
21-Mar-91 #	3.7	6.4	6.0	4.9	8.0	5.1	BDL	BDL
25-Mar-91	3.1	6.3	6.9	4.6	9.0	5.4	BDL	ND
01-Apr-91	3.4	6.6	7.0	4.9	9.3	5.5	BDL	ND
08-Apr-91	2.7	5.4	6.2	4.2	7.0	4.7	BDL	ND
15-Apr-91 *	3.6	6.4	6.9	4.5	7.7	4.8	BDL	BDL
29-Apr-91	3.0	6.5	6.8	4.5	8.9	5.3	BDL	ND
13-May-91	3.0	7.3	7.8	4.6	9.3	5.0	BDL	BDL
17-Jun-91	3.1	8.0	7.6	5.2	9.6	5.6	BDL	BDL
11-Jul-91	3.9	8.4	9.2	5.8	10	6.3	BDL	BDL
18-Jul-91 *	3.2	7.6	7.4	4.2	8.1	4.6	BDL	BDL
19-Aug-91 ^	3.8	8.3	9.0	5.9	10	5.8	BDL	BDL
31-Oct-91 *	4.6	9.2	8.9	5.6	9.7	5.8	BDL	BDL

COMMENTS:

Units of concentration in ppb
 Below detection level (BDL) = < 1 ppb
 ND = Not Done
 # EPA Method 524.2 List
 ^ No longer testing for VC, Now CE

(a) Benzene = 1.8 ppb
 (b) Trimethylbenzene = 1.7 ppb

QUARTERLY SAMPLING

(1) 1st Quarter 1990 - Acculab Research
 (2) 2nd Quarter 1990 - Cenref Lab
 (3) 3rd Quarter 1990 - KWTF Lab
 (4) 4th Quarter 1990 - KWTF Lab
 * 1991 Quarterly Sample - KWTF Lab

South Adams County Water
And Sanitation District
Klein Water Treatment Facility
7400 Quebec Street
P.O. Box 597
Commerce City, CO 80037-0597

WELL 17

DATE COLLECTED	1,1 DCE	1,1 DCA	C-1,2 DCE	1,1,1 TCA	TCE	PCE	TCFM	VC
27-Feb-90	3.6	BDL	BDL	7.4	7.5	BDL	ND	ND
27-Feb-90 (1)	6	BDL	BDL	6	8	BDL	BDL	BDL
10-May-90	2.6	BDL	BDL	5.0	7.3	1.5	ND	ND
10-May-90 (2)	2	BDL	BDL	4	6	BDL	BDL	BDL
31-Jul-90	3.7	BDL	1.6	7.0	15	2.3	ND	ND
06-Aug-90	3.3	1.4	1.9	5.8	16	2.8	ND	ND
13-Aug-90	1.8	BDL	BDL	4.0	12	1.7	ND	ND
17-Aug-90 (3)	2.4	1.0	1.3	4.1	12	2.0	BDL	BDL
04-Sep-90	3.1	1.7	2.8	4.9	18	3.5	ND	ND
03-Oct-90 (4)	2.7	BDL	1.4	4.0	11	2.2	BDL	BDL
17-Dec-90	5.4	BDL	BDL	8.8	11	BDL	ND	ND
04-Apr-91	2.5	BDL	BDL	4.5	5.4	BDL	BDL	ND
08-Apr-91	2.6	BDL	BDL	4.9	5.9	1.1	BDL	ND
15-Apr-91 *	3.2	BDL	BDL	5.5	5.6	BDL	BDL	BDL
29-Apr-91	3.2	BDL	BDL	5.7	5.8	1.1	BDL	ND
06-May-91	2.4	BDL	BDL	4.8	5.7	1.1	BDL	BDL
13-May-91	4.7	BDL	BDL	9.1	10	BDL	BDL	BDL
24-Jun-91	1.8	BDL	BDL	4.5	6.8	BDL	BDL	BDL
01-Jul-91	2.6	BDL	BDL	5.0	8.2	1.2	BDL	BDL
08-Jul-91	2.5	BDL	BDL	4.5	7.8	1.3	BDL	BDL
15-Jul-91	1.9	BDL	BDL	3.5	6.3	1.6	BDL	BDL
18-Jul-91 *	2.0	BDL	BDL	3.2	5.6	1.5	BDL	BDL
01-Aug-91	2.0	BDL	BDL	3.6	6.6	1.9	BDL	BDL
05-Aug-91	1.6	BDL	BDL	3.1	4.8	1.1	BDL	BDL
19-Aug-91 ^	1.6	BDL	BDL	2.9	5.2	1.3	BDL	BDL
03-Sep-91	1.5	BDL	BDL	3.0	6.0	1.7	BDL	BDL
09-Sep-91	1.6	BDL	BDL	3.1	5.8	1.4	BDL	BDL
16-Sep-91	2.3	BDL	1.0	4.0	7.0	1.7	BDL	BDL
23-Sep-91	1.6	BDL	BDL	3.0	5.4	1.6	BDL	BDL
30-Sep-91	1.6	BDL	BDL	2.8	5.5	1.6	BDL	BDL
15-Oct-91	1.8	BDL	1.1	3.2	6.5	2.1	BDL	BDL
21-Oct-91	1.5	BDL	1.0	2.4	5.8	2.0	BDL	BDL
31-Oct-91 *	3.1	BDL	BDL	4.4	6.2	1.6	BDL	BDL

COMMENTS:

Units of concentration in ppb
Below detection level (BDL) = < 1 ppb
^ No longer testing for VC, Now CE

QUARTERLY SAMPLING

- (1) 1st Quarter 1990 - Acculab Research
- (2) 2nd Quarter 1990 - Cenref Lab
- (3) 3rd Quarter 1990 - KWTF Lab
- (4) 4th Quarter 1990 - KWTF Lab
- * 1991 Quarterly Sample - KWTF Lab

Appendix D Klein Water Treatment Facility
Influent Monitoring Data. ¹

1 Monitoring data appearing in the Appendix is dated at the earliest, February 12, 1990. This is the date at which the laboratory at Klein Water Treatment Facility began operation.

**South Adams County Water
And Sanitation District
Klein Water Treatment Facility
7400 Quebec Street
P.O. Box 597
Commerce City, CO 80037-0597**

KWTF INFLUENT

DATE COLLECTED	1,1 DCE	1,1 DCA	C-1,2 DCE	1,1,1 TCA	TCE	PCE			WELLS
12-Feb-90	1.4	BDL	1.4	3.0	9.8	8.3			
14-Feb-90	1.4	BDL	1.6	2.6	10	9.5			
20-Feb-90	BDL	1.1	2.3	1.8	14	11			
27-Feb-90	4.2	BDL	BDL	8.2	8.4	BDL			17
07-Mar-90	1.5	1.2	2.6	2.7	16	4.0			3
12-Mar-90	1.5	1.1	2.4	2.9	15	4.0			3
21-Mar-90	1.6	1.2	2.2	3.0	14	3.5			
03-Apr-90	1.6	1.0	2.1	2.2	12	12			3,14
09-Apr-90	2.4	1.4	2.5	4.5	18	4.5			3
18-Apr-90	1.4	BDL	1.7	2.4	12	9.3			3,14
03-May-90	2.6	BDL	BDL	6.2	8.4	1.2			17
15-May-90	2.2	BDL	BDL	4.2	7.6	2.3			
01-Jun-90	2.3	BDL	BDL	4.0	7.5	1.5			
05-Jun-90	2.2	BDL	1.7	4.1	9.0	6.9			
28-Jun-90	2.4	1.5	2.8	4.4	15	6.4			
03-Jul-90	2.5	1.8	2.8	4.4	16	6.3			
09-Jul-90	2.7	1.0	1.5	5.7	13	9.0			
16-Jul-90	1.8	1.5	2.3	3.2	13	7.8			14,17
23-Jul-90	2.4	1.1	1.7	4.9	13	4.1			
30-Jul-90	2.5	1.1	1.9	4.6	14	6.5			
06-Aug-90	1.9	1.0	1.7	3.2	11	7.7			
13-Aug-90	2.5	1.9	2.6	5.7	18	9.1			
21-Aug-90	2.5	1.4	1.8	4.4	13	9.0			
23-Aug-90	2.3	1.1	1.8	4.0	13	9.7			
04-Sep-90	2.7	2.3	3.7	4.2	17	7.6			
06-Sep-90	2.7	2.3	3.7	4.2	17	7.6			
07-Sep-90	2.5	1.3	2.2	4.0	16	3.6			
10-Sep-90	2.1	1.7	2.5	4.5	13	7.3			
17-Sep-90	2.3	1.5	2.5	3.8	15	7.7			
18-Sep-90	2.4	1.4	2.2	3.8	10	6.7			
19-Sep-90	2.2	1.4	2.1	3.5	9.7	7.0			
28-Sep-90	3.4	2.1	3.4	5.5	20	4.5			
01-Oct-90	2.4	1.4	2.4	3.8	14	9.4			
09-Oct-90	2.7	1.7	2.7	4.3	13	3.6			
15-Oct-90	1.8	3.1	4.4	3.3	18	27			
22-Oct-90	2.6	1.3	2.2	4.3	9.3	3.1			
29-Oct-90	1.7	2.7	3.8	2.6	14	13			
05-Nov-90	2.0	3.4	4.5	3.2	16	15			2,14,15
13-Nov-90	1.8	2.6	3.9	2.7	13	12			2,14,15
19-Nov-90	1.8	2.7	4.1	2.8	13	13			2,14,15

COMMENTS: Units of concentration in ppb
Below detection level (BDL) = < 1 ppb

*South Adams County Water
And Sanitation District
Klein Water Treatment Facility
7400 Quebec Street
P.O. Box 597
Commerce City, CO 80037-0597*

KWTF INFLUENT

DATE COLLECTED	1,1 DCE	1,1 DCA	C-1,2 DCE	1,1,1 TCA	TCE	PCE	TCFM	VC	WELLS
26-Nov-90	1.7	2.7	3.8	2.7	13	12	ND	ND	2,14,16
03-Dec-90	1.7	2.5	3.8	2.7	12	12	ND	ND	2,14,16
10-Dec-90	1.8	2.3	3.5	2.6	12	12	ND	ND	2,14,16
17-Dec-90	1.8	BDL	BDL	3.0	5.0	1.6	ND	ND	
26-Dec-90	2.9	BDL	BDL	5.1	6.8	1.6	ND	ND	5
31-Dec-90	1.2	2.1	3.1	2.2	9.6	13	ND	ND	2,14,16
07-Jan-91	3.5	1.3	1.9	6.0	8.6	2.6	ND	ND	5,16
08-Jan-91	1.6	2.2	3.3	2.5	12	13	ND	ND	
09-Jan-91	1.3	1.8	2.5	2.0	9.2	12	ND	ND	
14-Jan-91	1.0	1.1	2.4	1.6	9.2	12	ND	ND	2,14
21-Jan-91	1.2	1.2	2.5	2.0	9.7	11	ND	ND	2,14
28-Jan-91	1.5	2.0	3.1	2.5	9.7	11	ND	ND	2,14,16
31-Jan-91	1.2	1.0	2.4	2.5	10	4.1	ND	ND	2,14
04-Feb-91	1.4	1.8	2.8	2.5	9.4	11	ND	ND	2,14,16
11-Feb-91	1.6	1.8	3.0	2.6	9.4	11	ND	ND	
19-Feb-91	1.7	1.9	3.0	2.7	9.5	11	ND	ND	2,14,16
25-Feb-91	1.4	1.8	2.8	2.4	8.3	9.1	ND	ND	2,14,16
01-Mar-91	1.6	1.0	2.5	2.7	9.8	11	ND	ND	2,14
11-Mar-91	1.8	1.8	3.0	3.0	8.9	9.4	1.1	ND	2,14,16
18-Mar-91	1.4	1.0	2.3	2.7	8.6	9.6	1.4	ND	2,14
19-Mar-91	1.7	1.6	2.8	3.0	8.8	8.2	1.0	ND	2,14,16
25-Mar-91	1.8	1.5	2.8	3.1	9.0	8.6	1.1	ND	2,14,16
01-Apr-91	2.1	1.9	3.1	3.2	9.5	9.6	1.5	ND	2,14,16
03-Apr-91	1.9	1.6	3.0	3.1	9.1	8.5	1.2	ND	2,14,16
04-Apr-91	2.6	BDL	1.1	4.6	7.2	6.1	BDL	ND	14,17
08-Apr-91	3.3	BDL	BDL	5.7	6.2	1.4	BDL	ND	2,16,17
09-Apr-91	2.2	1.8	2.8	3.5	10	10	BDL	ND	2,14,16
16-Apr-91	1.9	1.6	2.8	3.2	9.4	9.1	1.1	ND	2,14,16
22-Apr-91 A	1.9	1.9	3.4	3.1	9.2	10	1.4	BDL	2,14,16
22-Apr-91 P	1.7	1.6	3.0	3.1	9.1	9.3	1.0	BDL	2,14,16
24-Apr-91	1.4	1.0	2.5	2.8	8.6	9.5	1.3	BDL	2,14,16
29-Apr-91 A	3.1	1.2	1.9	5.6	8.5	6.6	1.0	ND	14,16,17
29-Apr-91 P	2.8	1.0	1.7	5.0	7.6	5.9	BDL	ND	14,16,17
06-May-91	3.1	BDL	1.1	5.3	7.8	6.0	BDL	BDL	14,17
13-May-91	1.8	BDL	1.6	3.1	6.5	2.9	BDL	BDL	2,16,17
14-May-91 A	3.7	BDL	1.1	6.5	9.9	2.3	BDL	BDL	2,14,16,17
14-May-91 P	2.9	BDL	1.6	5.1	9.5	6.3	BDL	BDL	2,14,16,17
20-May-91	2.0	BDL	1.4	3.8	6.6	5.3	BDL	BDL	5,14
21-May-91	2.4	1.1	2.2	4.4	9.0	6.5	BDL	ND	2,5,14,16
28-May-91	3.1	BDL	BDL	5.1	7.3	1.7	BDL	BDL	5

COMMENTS: Units of concentration in ppb
Below detection level (BDL) = < 1 ppb

**South Adams County Water
And Sanitation District
Klein Water Treatment Facility
7400 Quebec Street
P.O. Box 597
Commerce City, CO 80037-0597**

KWTF INFLUENT

DATE COLLECTED	1,1 DCE	1,1 DCA	C-1,2 DCE	1,1,1 TCA	TCE	PCE	TCFM	VC	WELLS
03-Jun-91	2.8	BDL	1.0	4.8	7.2	1.8	BDL	BDL	5
10-Jun-91	2.8	BDL	1.0	4.4	7.3	2.0	BDL	BDL	5
17-Jun-91 A	2.7	2.0	2.6	4.6	9.2	3.7	BDL	BDL	2,5,14,16
17-Jun-91 P	2.5	1.3	2.2	4.7	11	7.8	BDL	BDL	2,3,5,14,16
24-Jun-91	2.3	BDL	1.0	4.2	8.1	7.1	BDL	BDL	5,14,17
01-Jul-91	2.4	BDL	1.6	3.9	9.2	5.4	BDL	BDL	2,5,14,17
08-Jul-91	2.2	BDL	1.6	3.9	9.4	3.1	BDL	BDL	2,5,17
09-Jul-91	2.2	BDL	1.6	3.8	9.3	3.3	BDL	BDL	2,5,17
11-Jul-91 A	2.5	1.1	2.2	4.3	13	6.2	BDL	BDL	2,5,14
11-Jul-91 P	2.2	1.7	3.0	3.9	13	9.0	BDL	BDL	2,3,5,16
15-Jul-91 A	2.1	BDL	1.8	4.0	10	3.7	BDL	BDL	2,17
15-Jul-91 P	2.0	BDL	1.7	3.3	9.8	BDL	BDL	BDL	2,3,14,17
16-Jul-91 A	2.0	1.1	2.2	3.5	11	6.9	BDL	BDL	2,3,14,17
16-Jul-91 P	2.0	1.3	2.5	3.4	11	6.8	BDL	BDL	2,3,14,16,17
23-Jul-91	1.9	BDL	BDL	3.2	6.2	1.9	BDL	BDL	17
29-Jul-91	1.8	BDL	2.1	3.4	11	3.7	BDL	BDL	2,17
01-Aug-91	2.2	1.3	2.8	4.0	14	5.5	1.5	BDL	2,3,17
05-Aug-91 A	2.4	BDL	2.2	4.1	11	3.8	1.3	BDL	3,17
05-Aug-91 P	2.4	BDL	2.2	4.2	12	4.0	1.2	BDL	3,17
06-Aug-91	2.2	BDL	2.2	4.2	12	4.0	1.3	BDL	3,17
12-Aug-91 ^	2.1	BDL	1.8	3.6	10	3.5	1.0	BDL	3,17
19-Aug-91 A	1.8	BDL	2.0	3.3	10	7.9	BDL	BDL	3,14,17
19-Aug-91 P	1.8	1.2	2.1	3.2	9.4	6.7	BDL	BDL	3,14,16,17
26-Aug-91	2.2	1.2	2.5	4.0	11	4.0	BDL	BDL	3,5,16,17
03-Sep-91 A	2.3	1.1	2.4	3.9	12	4.0	1.2	BDL	3,17
03-Sep-91 P	2.1	1.1	2.3	3.5	11	7.2	1.2	BDL	3,14,17
06-Sep-91	2.1	1.4	2.7	3.6	11	6.6	1.1	BDL	3,14,17
09-Sep-91 A	2.4	1.0	2.2	4.2	12	3.8	1.2	BDL	3,17
09-Sep-91 P	2.1	1.2	2.5	3.6	11	6.7	1.2	BDL	
10-Sep-91	2.5	1.0	2.3	4.0	12	4.3	1.1	BDL	3,17
11-Sep-91	2.0	1.0	2.1	3.6	12	8.7	1.0	BDL	
16-Sep-91 A	2.5	BDL	2.2	4.1	12	3.4	BDL	BDL	2,17
16-Sep-91 P	2.4	BDL	2.1	3.9	12	2.9	BDL	BDL	
23-Sep-91 A	2.1	BDL	2.0	3.7	11	3.3	BDL	BDL	2,17
23-Sep-91 P	1.8	1.0	2.2	3.3	11	6.9	BDL	BDL	2,14,17
30-Sep-91	2.0	1.5	2.6	3.4	10	6.4	BDL	BDL	2,14,17
07-Oct-91	2.0	BDL	1.0	3.3	6.6	2.4	BDL	BDL	17
15-Oct-91	2.0	1.0	2.2	3.5	10	4.1	1.1	BDL	3,17
21-Oct-91	1.9	BDL	1.3	3.0	7.1	2.8	BDL	BDL	17
22-Oct-91	2.1	BDL	1.3	3.3	7.2	2.9	BDL	BDL	14,17

COMMENTS:

Units of concentration in ppb
Below detection level (BDL) = < 1 ppb

^ No longer testing for VC, Now CE

Appendix E Klein Water Treatment Facility
Effluent Monitoring Data. ¹

- 1 Monitoring data appearing in the Appendix is dated at the earliest, February 12, 1990. This is the date at which the laboratory at Klein Water Treatment Facility began operation.

*South Adams County Water
And Sanitation District
Klein Water Treatment Facility
7400 Quebec Street
P.O. Box 597
Commerce City, CO 80037-0597*

KWTF EFFLUENT

DATE COLLECTED	1,1 DCE	1,1 DCA	C-1,2 DCE	1,1,1 TCA	TCE	PCE
12-Feb-90	BDL	BDL	BDL	BDL	BDL	BDL
14-Feb-90	BDL	BDL	BDL	BDL	BDL	BDL
20-Feb-90	BDL	BDL	BDL	BDL	BDL	BDL
27-Feb-90	BDL	BDL	BDL	BDL	BDL	BDL
07-Mar-90	BDL	BDL	BDL	BDL	BDL	BDL
12-Mar-90	BDL	BDL	BDL	BDL	BDL	BDL
21-Mar-90	BDL	1.1	BDL	1.1	BDL	BDL
03-Apr-90	BDL	1.2	BDL	1.3	BDL	BDL
09-Apr-90	BDL	1.2	BDL	1.6	BDL	BDL
18-Apr-90	BDL	BDL	BDL	1.0	BDL	BDL
03-May-90	BDL	BDL	BDL	1.2	BDL	BDL
10-May-90	BDL	BDL	BDL	BDL	BDL	BDL
15-May-90	BDL	BDL	BDL	BDL	BDL	BDL
01-Jun-90	BDL	BDL	BDL	BDL	BDL	BDL
05-Jun-90	BDL	BDL	BDL	BDL	BDL	BDL
28-Jun-90	BDL	BDL	BDL	1.3	BDL	BDL
03-Jul-90	BDL	BDL	BDL	1.5	BDL	BDL
09-Jul-90	BDL	BDL	BDL	1.4	BDL	BDL
16-Jul-90	BDL	BDL	BDL	1.2	BDL	BDL
23-Jul-90	BDL	BDL	BDL	1.5	BDL	BDL
30-Jul-90	BDL	BDL	BDL	1.5	BDL	BDL
06-Aug-90	BDL	BDL	BDL	1.3	BDL	BDL
13-Aug-90	BDL	1.3	BDL	1.8	1.0	BDL
21-Aug-90	BDL	1.2	BDL	2.1	1.1	BDL
23-Aug-90	1.2	1.5	1.3	2.5	1.4	BDL
04-Sep-90	1.3	1.5	1.4	2.6	1.8	BDL
06-Sep-90	1.3	1.5	1.4	2.6	1.8	BDL
07-Sep-90	1.1	1.5	1.4	2.6	1.6	BDL
10-Sep-90	1.2	1.5	1.4	3.0	1.9	BDL
17-Sep-90	1.2	1.5	1.5	2.8	2.0	BDL
18-Sep-90	1.2	1.4	1.4	2.4	1.7	BDL
19-Sep-90	1.0	1.4	1.1	2.1	1.3	BDL
28-Sep-90	1.4	1.7	1.6	2.9	1.4	BDL
01-Oct-90	1.7	1.8	1.7	3.4	1.5	BDL
09-Oct-90	1.4	1.5	1.6	2.6	1.3	BDL
15-Oct-90	1.3	1.5	1.5	2.6	1.0	BDL
22-Oct-90	1.2	1.4	1.5	2.6	1.0	BDL
29-Oct-90	1.4	1.7	1.7	2.8	1.1	BDL
05-Nov-90	1.4	2.1	2.0	2.9	1.2	BDL
13-Nov-90	1.2	1.8	1.7	2.5	1.1	BDL

COMMENTS: Units of concentration in ppb
Below detection level (BDL) = < 1 ppb

*South Adams County Water
And Sanitation District
Klein Water Treatment Facility
7400 Quebec Street
P.O. Box 597
Commerce City, CO 80037-0597*

KWTF EFFLUENT

DATE COLLECTED	1,1 DCE	1,1 DCA	C-1,2 DCE	1,1,1 TCA	TCE	PCE	TCFM	VC	Chloro form	Bromo form	DBCM	DCBM
19-Nov-90	1.4	2.1	2.0	2.7	1.3	BDL	ND	ND	BDL	6.2	BDL	BDL
26-Nov-90	1.5	2.2	2.2	2.8	1.4	BDL	ND	ND	BDL	10	1.2	BDL
03-Dec-90	1.6	2.2	2.2	3.0	1.5	BDL	ND	ND	BDL	11	1.1	BDL
10-Dec-90	1.7	2.2	2.5	3.0	1.6	BDL	ND	ND	BDL	7.7	1.0	BDL
17-Dec-90	1.6	2.1	2.3	2.8	1.4	BDL	ND	ND	BDL	7.5	1.0	BDL
26-Dec-90	1.5	1.8	2.2	3.0	1.5	BDL	ND	ND	BDL	11	1.3	BDL
31-Dec-90	1.4	1.7	2.4	3.2	1.8	BDL	ND	ND	BDL	7.3	1.0	BDL
07-Jan-91	1.8	1.8	2.6	3.6	2.2	BDL	ND	ND	BDL	8.8	1.0	BDL
08-Jan-91	1.8	1.8	2.5	3.5	2.2	BDL	ND	ND	BDL	7.0	1.0	BDL
09-Jan-91	1.2	1.4	1.6	2.4	1.4	BDL	ND	ND	BDL	8.0	BDL	BDL
14-Jan-91	1.4	1.6	2.0	2.8	1.6	BDL	ND	ND	BDL	7.0	BDL	BDL
21-Jan-91	1.6	1.8	2.1	2.9	1.7	BDL	ND	ND	BDL	6.8	BDL	BDL
28-Jan-91	1.5	1.8	2.3	2.8	1.7	BDL	ND	ND	BDL	7.6	1.0	BDL
31-Jan-91	1.3	1.6	2.2	2.7	1.7	BDL	ND	ND	BDL	6.6	BDL	BDL
04-Feb-91	1.4	1.6	2.1	2.8	1.7	BDL	ND	ND	BDL	3.4	BDL	BDL
11-Feb-91	1.4	1.7	2.1	2.8	1.7	BDL	ND	ND	BDL	8.1	1.0	BDL
19-Feb-91 *	2.2	2.0	2.7	3.2	1.8	BDL	BDL	BDL	BDL	13	1.1	BDL
25-Feb-91	1.4	1.6	2.2	2.7	1.8	BDL	ND	ND	BDL	6.9	BDL	BDL
01-Mar-91	1.6	1.8	2.6	3.1	2.1	BDL	ND	ND	BDL	7.6	1.1	BDL
11-Mar-91	1.7	1.6	2.4	2.9	2.0	BDL	BDL	ND	BDL	5.5	BDL	BDL
18-Mar-91	1.6	1.6	2.4	2.8	2.2	BDL	BDL	ND	BDL	14	1.4	BDL
19-Mar-91	1.1	1.4	2.1	2.3	1.6	BDL	BDL	ND	BDL	11	1.3	BDL
25-Mar-91	1.3	1.4	2.0	2.6	1.8	BDL	BDL	ND	BDL	8.4	1.0	BDL
01-Apr-91	1.6	1.7	2.6	3.2	2.2	BDL	BDL	ND	BDL	6.2	BDL	BDL
03-Apr-91	1.5	1.5	2.2	2.7	1.9	BDL	BDL	ND	BDL	9.8	1.0	BDL
04-Apr-91	1.6	1.5	2.3	3.1	2.5	BDL	BDL	ND	BDL	3.5	BDL	BDL
08-Apr-91	1.0	1.1	1.4	2.1	1.4	BDL	BDL	ND	BDL	3.5	BDL	BDL
09-Apr-91	1.0	1.4	1.6	2.4	1.3	BDL	BDL	ND	BDL	6.2	BDL	BDL
15-Apr-91 *	1.3	1.5	1.6	2.5	1.3	BDL	BDL	BDL	BDL	11	1.2	BDL
16-Apr-91	1.0	1.5	1.6	2.6	1.3	BDL	BDL	ND	BDL	3.4	BDL	BDL
22-Apr-91 A	1.3	1.6	2.3	2.8	1.7	BDL	BDL	BDL	BDL	11	1.3	BDL
22-Apr-91 P	1.3	1.5	2.3	2.9	1.6	BDL	BDL	BDL	BDL	12	1.4	BDL
24-Apr-91	1.4	1.6	2.2	2.9	1.6	BDL	BDL	BDL	BDL	16	1.7	BDL
29-Apr-91 A	1.5	1.5	2.3	3.3	2.3	BDL	BDL	ND	BDL	8.4	1.5	BDL
29-Apr-91 P	1.2	1.4	2.0	3.1	2.0	BDL	BDL	ND	BDL	5.4	1.3	BDL
06-May-91	1.2	1.3	1.8	2.7	1.6	BDL	BDL	BDL	BDL	5.5	1.2	BDL
13-May-91	1.0	1.0	1.5	2.2	1.6	BDL	BDL	BDL	BDL	7.9	1.6	BDL
14-May-91 A	1.3	BDL	1.6	2.6	1.5	BDL	BDL	BDL	BDL	4.0	BDL	BDL
14-May-91 P	1.3	BDL	1.5	2.6	1.5	BDL	BDL	BDL	BDL	7.8	1.2	BDL
20-May-91	1.2	1.0	1.7	2.7	1.7	BDL	BDL	BDL	BDL	12	1.6	BDL

COMMENTS:

Units of concentration in ppb

Below detection level (BDL) = < 1 ppb

ND = Not done

* 1991 Quarterly Sample - KWTF Lab

*South Adams County Water
And Sanitation District
Klein Water Treatment Facility
7400 Quebec Street
P.O. Box 597
Commerce City, CO 80037-0597*

KWTF EFFLUENT

DATE COLLECTED	1,1 DCE	1,1 DCA	C-1,2 DCE	1,1,1 TCA	TCE	PCE	TCFM	VC	Chloro form	Bromo form	DBCM	DCBM
21-May-91	1.1	BDL	1.5	2.5	1.7	BDL	BDL	ND	BDL	6.6	BDL	BDL
28-May-91	1.3	BDL	1.5	2.5	1.6	BDL	BDL	BDL	BDL	10	1.1	BDL
03-Jun-91	1.2	BDL	1.4	2.5	1.6	BDL	BDL	BDL	BDL	11	1.3	BDL
10-Jun-91	1.4	BDL	1.5	2.5	1.6	BDL	BDL	BDL	BDL	5.2	BDL	BDL
17-Jun-91 A	1.4	BDL	1.5	2.9	1.8	BDL	BDL	BDL	BDL	9.2	1.0	BDL
17-Jun-91 P	1.4	1.0	1.4	3.4	1.9	BDL	BDL	BDL	BDL	11	1.0	BDL
24-Jun-91	1.5	BDL	1.5	3.0	1.9	BDL	BDL	BDL	BDL	9.4	1.0	BDL
01-Jul-91	1.4	BDL	1.4	3.0	2.0	BDL	BDL	BDL	BDL	12	1.2	BDL
08-Jul-91	1.4	BDL	1.3	2.8	2.1	BDL	BDL	BDL	BDL	13	1.1	BDL
09-Jul-91	1.4	BDL	1.4	2.9	2.2	BDL	BDL	BDL	BDL	11	1.3	BDL
11-Jul-91 A	1.4	BDL	1.4	2.9	2.3	BDL	BDL	BDL	BDL	11	1.0	BDL
11-Jul-91 P	1.4	BDL	1.5	2.8	2.2	BDL	BDL	BDL	BDL	8.2	1.0	BDL
15-Jul-91 A	1.4	BDL	1.4	2.7	1.9	BDL	BDL	BDL	BDL	12	1.1	BDL
15-Jul-91 P	1.3	BDL	1.3	2.7	2.0	BDL	BDL	BDL	BDL	8.7	1.2	BDL
16-Jul-91 A	1.3	BDL	1.3	2.8	2.0	BDL	BDL	BDL	BDL	10	1.2	BDL
16-Jul-91 P	1.3	BDL	1.2	2.9	2.1	BDL	BDL	BDL	BDL	3.1	BDL	BDL
17-Jul-91 *	1.4	BDL	1.3	2.4	2.2	BDL	BDL	BDL	BDL	5.2	BDL	BDL
23-Jul-91	1.2	BDL	1.4	2.3	1.9	BDL	BDL	BDL	BDL	10	1.2	BDL
29-Jul-91	1.4	BDL	1.4	2.6	2.0	BDL	BDL	BDL	BDL	10	BDL	BDL
01-Aug-91	1.5	1.0	1.6	3.0	2.4	BDL	BDL	BDL	BDL	3.9	BDL	BDL
05-Aug-91 A	1.3	1.0	1.7	2.7	2.1	BDL	BDL	BDL	BDL	7.1	BDL	BDL
05-Aug-91 P	1.4	1.0	1.7	2.8	2.1	BDL	BDL	BDL	BDL	6.6	BDL	BDL
06-Aug-91	1.3	BDL	1.5	2.8	2.1	BDL	BDL	BDL	BDL	6.0	BDL	BDL
12-Aug-91 ^	1.3	BDL	1.5	2.7	2.0	BDL	BDL	BDL	BDL	11	1.2	BDL
19-Aug-91 A	1.4	BDL	1.6	2.9	2.3	BDL	BDL	BDL	BDL	8.0	1.0	BDL
19-Aug-91 P	1.2	BDL	1.4	2.6	2.2	BDL	BDL	BDL	BDL	7.7	3.0	BDL
26-Aug-91	1.5	BDL	1.8	3.2	3.2	BDL	BDL	BDL	BDL	8.4	1.2	BDL
03-Sep-91 A	1.6	1.0	1.7	3.0	2.8	BDL	BDL	BDL	BDL	8.3	1.1	BDL
03-Sep-91 P	1.5	1.0	1.8	3.0	2.8	BDL	BDL	BDL	BDL	4.5	BDL	BDL
06-Sep-91	1.4	BDL	1.6	2.6	2.7	BDL	BDL	BDL	BDL	7.4	2.4	BDL
09-Sep-91 A	1.3	1.0	1.6	2.8	2.7	BDL	BDL	BDL	BDL	6.7	1.6	BDL
09-Sep-91 P	1.4	1.0	1.6	2.8	2.7	BDL	BDL	BDL	BDL	6.7	1.6	BDL
10-Sep-91	1.3	1.0	1.5	2.6	2.5	BDL	BDL	BDL	BDL	10	1.6	BDL
11-Sep-91	1.3	1.0	1.6	3.0	2.7	BDL	BDL	BDL	BDL	5.1	1.6	BDL
16-Sep-91 A	1.6	1.1	1.8	3.2	3.2	BDL	BDL	BDL	BDL	23	2.8	BDL
16-Sep-91 P	1.4	1.0	1.7	2.9	3.2	BDL	BDL	BDL	BDL	11	2.1	BDL
23-Sep-91 A	1.6	1.0	1.6	3.0	3.6	BDL	BDL	BDL	BDL	8.4	1.5	BDL
23-Sep-91 P	1.5	1.0	1.8	3.1	3.8	BDL	BDL	BDL	BDL	13	1.9	BDL
30-Sep-91	1.5	1.2	1.7	3.0	2.7	BDL	BDL	BDL	BDL	11	2.0	BDL
07-Oct-91	1.4	1.1	1.7	2.9	2.5	BDL	BDL	BDL	BDL	21	2.2	BDL

COMMENTS:

Units of concentration in ppb

Below detection level (BDL) = < 1 ppb

ND = Not done

* 1991 Quarterly Sample - KWTF Lab

^ No longer testing for VC, now CE

Appendix F South Adams County Water and Sanitation District
Reservoir Monitoring Data. ¹

- 1 Monitoring data appearing in the Appendix is dated at the earliest, February 12, 1990. This is the date at which the laboratory at Klein Water Treatment Facility began operation.

RESERVOIR 1

DATE COLLECTED	1,1 DCE	1,1 DCA	C-1,2 DCE	1,1,1 TCA	TCE	PCE	TCFM	VC	Chloro form	Bromo form	DBCM	DCBM
13-Feb-90	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	ND	ND	ND	ND
19-Mar-90	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	14	1.1	BDL
13-Apr-90	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	22	1.4	BDL
14-May-90	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	9.2	BDL	BDL
29-Nov-90 (4)	1.2	1.8	1.6	2.5	1.2	BDL	BDL	BDL	BDL	19	1.7	BDL
10-Dec-90	1.4	2.0	2.1	2.6	1.3	BDL	ND	ND	BDL	18	1.4	BDL
17-Dec-90	1.4	1.6	2.1	2.4	1.3	BDL	ND	ND	BDL	13	1.1	BDL
26-Dec-90	1.3	1.4	1.9	2.6	1.3	BDL	ND	ND	BDL	16	1.2	BDL
31-Dec-90	1.2	1.3	2.1	2.5	1.5	BDL	ND	ND	BDL	16	1.2	BDL
07-Jan-91	1.5	1.7	2.4	3.0	1.9	BDL	ND	ND	BDL	20	1.6	BDL
14-Jan-91	1.2	1.4	1.9	2.1	1.4	BDL	ND	ND	BDL	22	1.5	BDL
21-Jan-91	1.2	1.4	1.9	2.3	1.4	BDL	ND	ND	BDL	20	1.5	BDL
28-Jan-91	1.2	1.4	1.7	2.1	1.4	BDL	ND	ND	BDL	22	1.5	BDL
04-Feb-91	1.3	1.6	2.2	2.7	1.8	BDL	ND	ND	BDL	24	1.9	BDL
11-Feb-91	1.2	1.5	2.0	2.6	1.6	BDL	ND	ND	BDL	26	1.7	BDL
19-Feb-91 *	1.6	1.7	2.1	2.8	1.7	BDL	BDL	BDL	BDL	21	1.6	BDL
25-Feb-91	1.1	1.3	2.0	2.1	1.5	BDL	ND	ND	BDL	19	1.2	BDL
01-Mar-91	1.5	1.6	2.4	2.8	1.9	BDL	ND	ND	BDL	28	1.8	BDL
11-Mar-91	1.4	1.4	2.2	2.5	1.8	BDL	BDL	ND	BDL	28	1.9	BDL
20-Mar-91	1.3	1.5	2.1	2.5	1.8	BDL	BDL	ND	BDL	22	1.8	BDL
25-Mar-91	1.2	1.3	2.1	2.4	1.7	BDL	BDL	ND	BDL	21	1.8	BDL
01-Apr-91	1.4	1.5	2.2	2.7	1.9	BDL	BDL	ND	BDL	30	2.0	BDL
08-Apr-91	BDL	1.1	1.5	2.0	1.4	BDL	BDL	ND	BDL	15	1.9	BDL
15-Apr-91 *	1.3	1.4	1.6	2.3	1.3	BDL	BDL	BDL	BDL	25	2.2	BDL
29-Apr-91	1.2	1.4	2.0	2.7	1.9	BDL	BDL	ND	BDL	21	2.6	BDL
06-May-91	1.0	1.0	1.6	2.1	1.3	BDL	BDL	BDL	BDL	18	2.2	BDL
13-May-91	1.0	BDL	1.4	2.1	1.5	BDL	BDL	BDL	BDL	14	2.2	BDL
20-May-91	1.0	BDL	1.3	2.2	1.5	BDL	BDL	BDL	BDL	16	2.1	BDL
28-May-91	1.0	BDL	1.4	2.3	1.5	BDL	BDL	BDL	BDL	16	2.2	BDL
03-Jun-91	1.1	BDL	1.4	2.3	1.5	BDL	BDL	BDL	BDL	15	2.0	BDL
10-Jun-91	1.2	BDL	1.3	2.9	1.6	BDL	BDL	BDL	BDL	14	1.9	BDL
17-Jun-91	1.3	BDL	1.4	2.9	1.7	BDL	BDL	BDL	BDL	20	1.7	BDL
24-Jun-91	1.4	BDL	1.4	3.0	1.8	BDL	BDL	BDL	BDL	20	1.6	BDL
01-Jul-91	1.4	BDL	1.2	2.7	1.9	BDL	BDL	BDL	BDL	14	1.8	BDL
08-Jul-91	1.4	BDL	1.5	3.2	2.4	BDL	BDL	BDL	BDL	22	2.7	BDL
11-Jul-91	1.2	BDL	1.4	2.8	2.2	BDL	BDL	BDL	BDL	14	1.7	BDL
15-Jul-91	1.2	BDL	1.4	2.6	1.8	BDL	BDL	BDL	BDL	11	1.5	BDL
17-Jul-91 *	1.6	BDL	1.4	2.8	2.2	BDL	BDL	BDL	BDL	16	1.4	BDL

COMMENTS:

Units of Concentration in ppb
 Below Detection Level (BDL) = < 1 ppb
 Not Done (ND)

1st, 2nd, 3rd Quarters 1990 Not Done
 (4) 4th Quarter 1990 - KWTF Lab
 * 1991 Quarterly Data - KWTF Lab

South Adams County Water
 And Sanitation District
 Klein Water Treatment Facility
 7400 Quebec Street
 P.O. Box 597
 Commerce City, CO 80037-0579

GC/MS Report
 Volatile Organics Analysis

RESERVOIR 1

DATE COLLECTED	1,1 DCE	1,1 DCA	C-1,2 DCE	1,1,1 TCA	TCE	PCE	TCFM	VC	Chloro form	Bromo form	DBCM	DCBM
23-Jul-91	1.0	BDL	1.4	2.2	2.0	BDL	BDL	BDL	BDL	7.9	1.3	BDL
01-Aug-91	1.4	BDL	1.6	2.9	2.3	BDL	BDL	BDL	BDL	10	1.8	BDL
05-Aug-91	1.1	BDL	1.4	2.5	2.0	BDL	BDL	BDL	BDL	14	2.1	BDL
12-Aug-91 ^	1.2	BDL	1.4	2.6	2.0	BDL	BDL	BDL	BDL	12	1.7	BDL
19-Aug-91	1.2	BDL	1.4	2.7	2.1	BDL	BDL	BDL	BDL	11	1.6	BDL
26-Aug-91	1.5	1.0	1.8	3.1	3.2	BDL	BDL	BDL	BDL	15	2.1	BDL
03-Sep-91	1.2	BDL	1.5	2.7	2.6	BDL	BDL	BDL	BDL	19	2.2	BDL
09-Sep-91	1.2	BDL	1.6	2.6	2.5	BDL	BDL	BDL	BDL	9.6	2.2	BDL
16-Sep-91	1.4	1.1	1.9	3.1	3.2	BDL	BDL	BDL	BDL	11	2.4	BDL
23-Sep-91	1.5	1.1	1.7	3.2	3.7	BDL	BDL	BDL	BDL	9.2	1.7	BDL
30-Sep-91	1.4	1.2	1.8	3.0	2.5	BDL	BDL	BDL	BDL	14	2.9	BDL
07-Oct-91	1.1	BDL	1.5	2.5	2.1	BDL	BDL	BDL	BDL	19	2.6	BDL
15-Oct-91	1.6	1.0	1.6	3.0	2.9	BDL	BDL	BDL	BDL	7.8	1.5	BDL
21-Oct-91	1.4	BDL	1.5	2.5	2.7	BDL	BDL	BDL	BDL	8.1	1.4	BDL
28-Oct-91	1.3	1.1	1.6	2.6	2.0	BDL	BDL	BDL	BDL	11	1.7	BDL
31-Oct-91 *	1.5	1.2	1.5	2.6	1.8	BDL	BDL	BDL	BDL	10	1.6	BDL
04-Nov-91	1.2	BDL	1.4	2.3	1.6	BDL	BDL	BDL	BDL	6.6	BDL	BDL
12-Nov-91	1.5	BDL	1.5	2.8	2.0	BDL	BDL	BDL	BDL	7.3	1.3	BDL
18-Nov-91	1.3	BDL	1.4	2.6	1.7	BDL	BDL	BDL	BDL	6.1	BDL	BDL
25-Nov-91	1.4	1.0	1.6	2.8	2.0	BDL	BDL	BDL	BDL	13	1.6	BDL
02-Dec-91	1.4	BDL	1.6	2.7	1.9	BDL	BDL	BDL	BDL	11	2.0	BDL

COMMENTS:

Units of Concentration in ppb

Below Detection Level (BDL) = < 1 ppb

Not Done (ND)

^ No longer testing for VC, Now CE

* 1991 Quarterly Data - KWTF Lab

RESERVOIR 2

DATE COLLECTED	1,1 DCE	1,1 DCA	C-1,2 DCE	1,1,1 TCA	TCE	PCE	TCFM	VC	Chloro form	Bromo form	DBCM	DCBM
13-Feb-90	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	ND	ND	ND	ND
19-Mar-90	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	14	1.4	BDL
13-Apr-90	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	18	1.1	BDL
14-May-90	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	13	BDL	BDL
29-Nov-90 (4)	1.0	1.6	1.5	2.0	BDL	BDL	BDL	BDL	BDL	20	1.6	BDL
10-Dec-90	1.0	1.8	1.9	2.1	1.2	BDL	ND	ND	BDL	24	1.5	BDL
17-Dec-90	1.1	1.5	2.0	2.1	1.2	BDL	ND	ND	BDL	17	1.1	BDL
26-Dec-90	BDL	1.1	1.6	1.8	1.1	BDL	ND	ND	BDL	15	1.2	BDL
31-Dec-90	BDL	1.3	2.0	2.1	1.4	BDL	ND	ND	BDL	14	1.2	BDL
07-Jan-91	1.1	1.4	2.0	2.2	1.6	BDL	ND	ND	BDL	18	1.4	BDL
14-Jan-91	BDL	1.0	1.5	1.4	BDL	BDL	ND	ND	BDL	21	1.4	BDL
21-Jan-91	BDL	1.2	1.4	1.6	1.0	BDL	ND	ND	BDL	19	1.4	BDL
29-Jan-91	BDL	1.1	1.5	1.5	1.0	BDL	ND	ND	BDL	25	1.6	BDL
04-Feb-91	BDL	1.3	1.9	1.9	1.3	BDL	ND	ND	BDL	24	1.7	BDL
11-Feb-91	BDL	1.2	1.7	1.9	1.2	BDL	ND	ND	BDL	26	1.8	BDL
19-Feb-91 *	1.0	1.3	1.6	1.8	1.2	BDL	BDL	BDL	BDL	22	1.3	BDL
25-Feb-91	BDL	1.2	1.8	1.8	1.2	BDL	ND	ND	BDL	19	1.2	BDL
01-Mar-91	1.1	1.4	2.0	2.1	1.6	BDL	ND	ND	BDL	24	1.7	BDL
11-Mar-91	1.0	1.2	2.1	2.1	1.6	BDL	BDL	ND	BDL	26	1.8	BDL
20-Mar-91	1.0	1.2	1.9	2.0	1.6	BDL	BDL	ND	BDL	21	1.6	BDL
25-Mar-91	BDL	1.1	1.7	1.8	1.2	BDL	BDL	ND	BDL	22	1.5	BDL
01-Apr-91	BDL	1.2	1.8	1.9	1.4	BDL	BDL	ND	BDL	30	1.8	BDL
08-Apr-91	BDL	1.0	1.2	1.6	1.2	BDL	BDL	ND	BDL	18	2.1	BDL
15-Apr-91 *	BDL	1.2	1.3	1.8	BDL	BDL	BDL	BDL	BDL	30	2.9	BDL
29-Apr-91	BDL	1.2	1.7	2.2	1.5	BDL	BDL	ND	BDL	23	2.5	BDL
06-May-91	BDL	1.1	1.6	2.0	1.3	BDL	BDL	BDL	BDL	21	3.0	BDL
13-May-91	BDL	BDL	1.2	1.8	1.3	BDL	BDL	BDL	BDL	14	2.0	BDL
20-May-91	BDL	BDL	1.2	1.8	1.2	BDL	BDL	BDL	BDL	19	2.0	BDL
28-May-91	BDL	BDL	1.4	2.0	1.3	BDL	BDL	BDL	BDL	17	2.0	BDL
03-Jun-91	BDL	BDL	1.3	2.0	1.4	BDL	BDL	BDL	BDL	18	2.1	BDL
10-Jun-91	1.0	BDL	1.3	2.5	1.4	BDL	BDL	BDL	BDL	27	2.1	BDL
17-Jun-91	1.1	BDL	1.3	2.6	1.6	BDL	BDL	BDL	BDL	18	1.7	BDL
24-Jun-91	BDL	BDL	1.3	2.5	1.6	BDL	BDL	BDL	BDL	18	1.3	BDL
01-Jul-91	1.1	BDL	1.2	2.5	1.7	BDL	BDL	BDL	BDL	15	2.1	BDL
08-Jul-91	1.1	BDL	1.3	2.4	1.7	BDL	BDL	BDL	BDL	19	2.3	BDL
11-Jul-91	1.0	BDL	1.2	2.3	1.8	BDL	BDL	BDL	BDL	20	2.1	BDL
15-Jul-91	BDL	BDL	1.1	2.2	1.4	BDL	BDL	BDL	BDL	13	1.6	BDL
17-Jul-91 *	1.2	1.0	1.3	3.0	2.0	BDL	BDL	BDL	BDL	14	1.4	BDL

COMMENTS:

Units of Concentration in ppb
 Below Detection Level (BDL) = < 1 ppb
 Not Done (ND)

1st, 2nd, 3rd Quarters 1990 – Not Done
 (4) 4th Quarter 1990 – KWTF Lab
 * 1991 Quarterly Data – KWTF Lab

South Adams County Water
 And Sanitation District
 Klein Water Treatment Facility
 7400 Quebec Street
 P.O. Box 597
 Commerce City, CO 80037-0579

GC/MS Report
 Volatile Organics Analysis

RESERVOIR 2

DATE COLLECTED	1,1 DCE	1,1 DCA	C-1,2 DCE	1,1,1 TCA	TCE	PCE	TCFM	VC	Chloro form	Bromo form	DBCM	DCBM
23-Jul-91	BDL	BDL	1.2	1.9	1.8	BDL	BDL	BDL	BDL	6.4	1.0	BDL
01-Aug-91	BDL	BDL	1.3	2.4	1.8	BDL	BDL	BDL	BDL	14	1.9	BDL
05-Aug-91	1.0	BDL	1.4	2.3	1.9	BDL	BDL	BDL	BDL	18	2.1	BDL
12-Aug-91 ^	BDL	BDL	1.2	2.2	1.6	BDL	BDL	BDL	BDL	12	1.6	BDL
19-Aug-91	BDL	BDL	1.2	2.3	1.7	BDL	BDL	BDL	BDL	14	1.8	BDL
26-Aug-91	1.4	BDL	1.7	2.8	3.1	BDL	BDL	BDL	BDL	16	2.0	BDL
03-Sep-91	BDL	BDL	1.4	2.5	2.0	BDL	BDL	BDL	BDL	21	2.3	BDL
09-Sep-91	1.0	BDL	1.4	2.4	2.3	BDL	BDL	BDL	BDL	9.2	2.1	BDL
16-Sep-91	BDL	BDL	1.4	2.2	2.2	BDL	BDL	BDL	BDL	9.1	1.6	BDL
23-Sep-91	BDL	BDL	1.4	2.4	2.5	BDL	BDL	BDL	BDL	9.1	1.5	BDL
30-Sep-91	BDL	1.1	1.2	2.5	1.7	BDL	BDL	BDL	BDL	14	3.1	BDL
07-Oct-91	BDL	BDL	BDL	1.8	1.5	BDL	BDL	BDL	BDL	20	2.9	BDL
15-Oct-91	1.1	BDL	1.5	2.5	2.4	BDL	BDL	BDL	BDL	8.5	1.5	BDL
21-Oct-91	1.0	BDL	1.2	1.9	2.2	BDL	BDL	BDL	BDL	8.8	1.4	BDL
28-Oct-91	BDL	BDL	1.1	1.7	1.3	BDL	BDL	BDL	BDL	14	1.7	BDL
31-Oct-91 *	BDL	BDL	1.0	1.6	1.2	BDL	BDL	BDL	BDL	15	1.6	BDL
04-Nov-91	BDL	BDL	BDL	1.2	BDL	BDL	BDL	BDL	BDL	12	1.5	BDL
12-Nov-91	BDL	BDL	1.2	2.0	1.4	BDL	BDL	BDL	BDL	9.2	1.7	BDL
18-Nov-91	BDL	BDL	1.0	1.7	1.2	BDL	BDL	BDL	BDL	10	1.0	BDL
25-Nov-91	BDL	BDL	1.1	1.7	1.2	BDL	BDL	BDL	BDL	13	1.3	BDL
02-Dec-91	BDL	BDL	1.2	1.7	1.3	BDL	BDL	BDL	BDL	10	1.9	BDL

COMMENTS: Units of Concentration in ppb
 Below Detection Level (BDL) = < 1
 Not Done (ND)

^ No longer testing for VC, Now CE
 * 1991 Quarterly Sample – KWTF Lab

RESERVOIR 3

DATE COLLECTED	1,1 DCE	1,1 DCA	C-1,2 DCE	1,1,1 TCA	TCE	PCE	TCFM	VC	Chloro form	Bromo form	DBCM	DCBM
13-Feb-90	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	ND	ND	ND	ND
19-Feb-90	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	9.9	BDL	BDL
13-Apr-90	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	13	BDL	BDL
14-May-90	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	8.4	BDL	BDL
05-Oct-90 (4)	BDL	BDL	1.1	1.2	BDL	BDL	BDL	BDL	BDL	9.4	1.8	BDL
29-Nov-90	BDL	BDL	BDL	1.2	BDL	BDL	ND	ND	BDL	9.9	3.3	BDL
10-Dec-90	BDL	1.0	BDL	1.3	BDL	BDL	ND	ND	BDL	24	5.9	1.0
13-Dec-90	BDL	1.1	1.1	1.5	BDL	BDL	ND	ND	BDL	12	2.8	BDL
17-Dec-90	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	8.5	2.0	BDL
26-Dec-90	BDL	BDL	1.2	1.5	BDL	BDL	ND	ND	BDL	9.9	1.1	BDL
31-Dec-90	BDL	BDL	1.0	1.3	BDL	BDL	ND	ND	BDL	8.4	2.1	BDL
07-Jan-91	BDL	1.1	1.5	2.1	1.3	BDL	ND	ND	BDL	14	3.4	BDL
14-Jan-91	1.0	1.1	1.6	1.8	1.1	BDL	ND	ND	BDL	19	3.0	BDL
21-Jan-91	1.4	1.6	2.1	2.6	1.5	BDL	ND	ND	BDL	18	1.5	BDL
28-Jan-91	BDL	BDL	1.0	1.2	BDL	BDL	ND	ND	BDL	11	3.6	BDL
04-Feb-91	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	10	3.8	1.0
11-Feb-91	BDL	BDL	BDL	1.3	BDL	BDL	ND	ND	BDL	15	1.7	BDL
19-Feb-91 *	BDL	1.0	1.2	1.6	1.0	BDL	BDL	BDL	BDL	18	2.5	BDL
25-Feb-91	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	11	2.5	BDL
01-Mar-91	BDL	BDL	1.0	1.3	BDL	BDL	ND	ND	BDL	14	2.3	BDL
11-Mar-91	BDL	BDL	1.2	1.6	1.0	BDL	BDL	ND	BDL	15	2.2	BDL
20-Mar-91	1.0	1.1	1.5	1.9	1.3	BDL	BDL	ND	BDL	16	1.4	BDL
21-Mar-91 #	BDL	1.0	1.3	1.8	1.2	BDL	BDL	ND	BDL	21	2.5	BDL
25-Mar-91	BDL	BDL	BDL	1.1	BDL	BDL	BDL	ND	BDL	14	2.8	BDL
01-Apr-91	BDL	BDL	1.2	1.5	1.0	BDL	BDL	ND	BDL	20	3.2	BDL
08-Apr-91	BDL	BDL	BDL	1.2	BDL	BDL	BDL	ND	BDL	12	2.7	BDL
15-Apr-91 *	BDL	BDL	BDL	1.0	BDL	BDL	BDL	BDL	BDL	12	2.5	BDL
29-Apr-91	BDL	BDL	1.5	2.0	1.4	BDL	BDL	ND	BDL	14	3.3	BDL
06-May-91	BDL	BDL	1.0	1.4	BDL	BDL	BDL	BDL	BDL	11	2.9	BDL
13-May-91	BDL	BDL	1.0	1.5	1.1	BDL	BDL	BDL	BDL	12	2.4	BDL
20-May-91	BDL	BDL	BDL	1.4	BDL	BDL	BDL	BDL	BDL	19	2.4	BDL
28-May-91	BDL	BDL	BDL	1.4	BDL	BDL	BDL	BDL	BDL	14	2.2	BDL
03-Jun-91	BDL	BDL	1.0	1.8	1.0	BDL	BDL	BDL	BDL	22	2.3	BDL
10-Jun-91	BDL	BDL	BDL	1.9	1.0	BDL	BDL	BDL	BDL	15	3.2	BDL
17-Jun-91	BDL	BDL	1.0	1.9	1.2	BDL	BDL	BDL	BDL	14	2.0	BDL
24-Jun-91	BDL	BDL	BDL	1.8	1.1	BDL	BDL	BDL	BDL	15	BDL	BDL
01-Jul-91	BDL	BDL	BDL	1.8	1.1	BDL	BDL	BDL	BDL	10	2.8	BDL
08-Jul-91	BDL	BDL	BDL	1.9	1.3	BDL	BDL	BDL	BDL	15	3.2	BDL

COMMENTS:

Units of Concentration in ppb

Below Detection Level (BDL) = < 1 ppb

Not Done (ND)

EPA Method 524.2 List

1st, 2nd, 3rd Quarter 1990 – Not Done

(4) 4th Quarter 1990 – KWTF Lab

* 1991 Quarterly Sample – KWTF Lab

**Appendix G Klein Water Treatment Facility
Operation and Maintenance Budgets.**



6595 EAST 70TH AVENUE
P.O. BOX 597
COMMERCE CITY, COLORADO 80037-0597
TELEPHONE 303 288-2646

February 14, 1990

Ms. Martha Nicodemus
Chief-Grants Management Branch
Office of Policy and Management
U.S. Environmental Protection Agency
Region VIII, One Denver Place
999 18th Street, Suite 500
Denver, CO 80202-2405

Dear Martha:

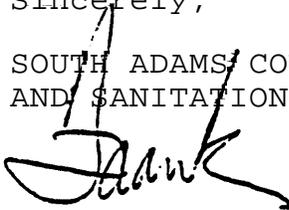
Enclosed for your information is the final budget comparison for the 1989 Operations and Maintenance Fund.

We will transfer an additional \$ 55,608 from the O & M Fund account and place it in the District's operating account on February 14, 1990.

If you have any questions please contact me.

Sincerely,

SOUTH ADAMS COUNTY WATER
AND SANITATION DISTRICT



Frank Kraly, CPA
Office Administrator

FK/kss

cc: Connally Mears
Glenn Bodnar
Jim Michael
Dave Brown
Lysle Dirrim

SOUTH ADAMS COUNTY WATER AND SANITATION DISTRICT
 OPERATION AND MAINTENANCE FUND
 BUDGET COMPARISON
 FOR THE TWELVE MONTHS ENDED DECEMBER 31, 1989
 PREPARED WITHOUT AUDIT

Item Description	Budget	Actual	Over (Under)
Salaries, Benefits, Payroll Taxes	\$ 130,322	\$ 74,995	\$ (55,327)
Power	35,000	11,063	(23,937)
Laboratory and Chemical Supplies	9,000	2,021	(6,679)
Uniforms	1,000	466	(534)
Telephone	1,500	706	(794)
Public Information	50,000	770	(49,230)
Quality Control Operational & SDWA Testing	15,000	5,726	(9,274)
Service Contracts			
Fire Protection	7,200	7,200	----
Police Protection	7,200	---	(7,200)
WTP Administrative/ Maintenance Expense	5,800	5,800*	----
Equipment Replacement and Repair	---	2,904	2,904
Insurance	5,833	1,065	(4,768)
Capital Expenditures			
Vehicle	10,705	11,765	1,060
Contingencies	<u>13,928</u>	<u>15,793*</u>	<u>1,865</u>
TOTAL	\$ <u>292,488</u>	\$ <u>140,574</u>	\$ <u>(151,914)</u>

* Truck Expense	\$ 667	
Education	9,678	
Engineering	9,101	(OSHA Regulations)
Operating Supplies	1,746	
Maintenance	<u>401</u>	
TOTAL	<u>\$ 21,593</u>	

Approved for Distribution



 Manager

Date: 2-14-90



6595 EAST 70TH AVENUE
P.O. BOX 597
COMMERCE CITY, COLORADO 80037-0597
TELEPHONE 303 288-2646

March 29, 1990

Ms. Martha Nicodemus
Chief-Grants Management Branch
Office of Policy and Management
U.S. Environmental Protection Agency
Region VIII, One Denver Place
999 18th Street, Suite 500
Denver, CO 80202-2405

Dear Martha:

We have received a signed negotiation agreement regarding indirect cost rates for management salaries to be reimbursed from the O & M Fund.

Based on information previously submitted to you regarding actual expenditures for the year ended December 31, 1989 and for the month of January 1990, I am transferring \$15,083 to the District operating account from the O & M Fund.

The calculation is as follows:

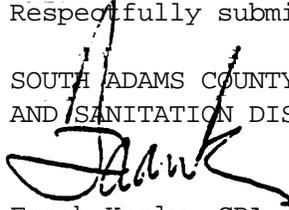
<u>Period</u>	<u>Direct Salaries</u>	<u>Indirect Rate</u>	<u>Amount</u>
1989	\$ 74,995	16.7 %	\$ 12,524
Jan 1990	17,897	14.3 %	<u>2,559</u>
		TOTAL	<u>\$ 15,083</u>

I have also enclosed a copy of the OMB Circular A-87 Cognizant Agency Negotiation Agreement for your files.

If you have any questions, please contact me at 288-2646.

Respectfully submitted,

SOUTH ADAMS COUNTY WATER
AND SANITATION DISTRICT


Frank Kraly, CPA
Office Administrator

FK/kss

enc.



6595 EAST 70TH AVENUE
P.O. BOX 597
COMMERCE CITY, COLORADO 80037-0597
TELEPHONE 303 288-2646

January 21, 1991

Mr. Glenn Bodnar
Public Health Engineer
Drinking Water Program
Water Quality Control Division
Colorado Department of Health
4210 East 11th Avenue
Denver, CO 80220-3716

Dear Glenn:

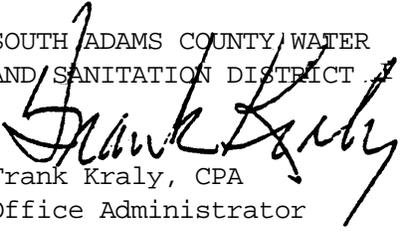
Enclosed for your information is the Operations and Maintenance Fund budget comparison for the twelve months ended December 31, 1990.

On January 21, 1991 I will transfer \$30,937.00 from the O&M account to the operating account for the District.

If you have any questions please contact me.

Respectfully submitted,

SOUTH ADAMS COUNTY WATER
AND SANITATION DISTRICT


Frank Kraly, CPA
Office Administrator

FR/kss

enc.

cc: Martha Nicodemus
Connally Mears
Dave Brown
Jim Michael
Lysle Dirrim
Col. Daniel R. Voss
Jim Jones

BUDGET-OPERATIONS

SOUTH ADAMS COUNTY WATER AND SANITATION DISTRICT

OPERATIONS AND MAINTENANCE FUND

BUDGET COMPARISON

1990

EXPENDITURES	PRIOR ELEVEN MONTHS ACTUAL	CURRENT MONTH DECEMBER	TOTAL ACTUAL	BUDGET	OVER (UNDER)
SALARIES	\$217,723	\$19,032	\$236,755	\$260,779	\$(24,024)
POWER	86,450	8,028	94,478	103,000	(8,522)
CARBON REPLACEMENT	---	---	---	---	---
GAS SUPPLIES	8,493	1,208	9,699	27,000	(17,301)
UNIFORMS	1,500	---	1,500	1,500	---
QUALITY CONTROL	15,191	429	15,620	36,000	(20,380)
CHEMICAL SUPPLIES	1,284	---	1,284	25,000	(23,716)
TRAINING	2,355	---	2,355	4,500	(2,145)
SERVICE CONTRACTS	16,665	1,130	17,795	22,750	(4,955)
INSURANCE	7,344	---	7,344	7,344	---
WTP ADMINISTRATIVE/ MAINTENANCE	16,247	1,102	17,349	21,000	(3,651)
EQUIPMENT REPLACEMENT & REPAIR	674	---	674	5,000	(4,326)
BROCHURES/VIDEO	59,000	---	59,000	59,000	---
CONTINGENCIES	7,402	---	7,402	27,164	(19,762)
TOTAL	\$440,328	\$30,937	\$471,265	\$630,087	\$(158,822)

COMMENTS:

WE ARE PLEASED WITH THE ACTUAL RESULTS COMPARED TO BUDGET FOR 1990.

APPROVED FOR DISTRIBUTION

Lawrence Ford

 MANAGER

1-21-91

 DATE



6595 EAST 70TH AVENUE
P.O. BOX 597
COMMERCE CITY, COLORADO 80037-0597
TELEPHONE 303 288-2646

January 23, 1992

Mr. Glenn Bodnar
Public Health Engineer
Drinking Water Program
Water Quality Control Division
Colorado Department of Health
4210 East 11th Avenue
Denver, CO 80220-3716

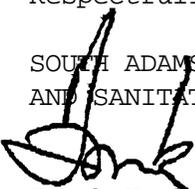
Dear Glenn:

Enclosed for your information is the Operations and Maintenance Fund budget comparison for the twelve months ended December 31, 1991.

On January 23, 1992 I will transfer \$33,497.00 from the O & M account to the operating account for the District. If you have any questions please contact me.

Respectfully submitted,

SOUTH ADAMS COUNTY WATER
AND SANITATION DISTRICT



Frank Kraly, CPA
Office Administrator

FR/ksf

enc.

cc: Martha Nicodemus
Connally Mears
Dave Brown
Jim Michael
Lysle Dirrim
Col. Eugene Bishop
Jim Jones

OPERATIONS

SOUTH ADAMS COUNTY WATER AND SANITATION DISTRICT

OPERATIONS AND MAINTENANCE FUND

BUDGET COMPARISON

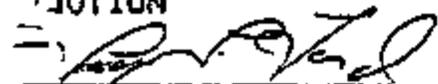
1991

EXPENDITURES	PRIOR MONTHS ACTUAL	CURRENT MONTH DECEMBER	TOTAL ACTUAL	AMENDED BUDGET	OVER (UNDER)
	\$ 87,732	\$ 7,852	\$ 95,584	\$100,000	\$ (4,416
REPAIRS & MAINTENANCE	32,323	3,973	36,316	84,500	(48,184
LABOR & CHEMICALS	13,302	1,352	14,654	143,500	(128,846
UTILITIES	838	---	838	1,500	(662
TRAVEL & TELEPHONE	2,423	238	2,661	3,000	(339
INSURANCE, BENEFITS, TAXES	218,560	19,985	238,545	269,706	(31,161
DEPRECIATION EXPENSE	563	52	615	1,300	(685
PROPERTY CONTROL:					
LAND	3,117	---	3,117	15,000	(11,883
ENGINEERING	14,409	---	14,409	18,832	(4,423
POWER	18,620	---	18,620	18,620	---
CONSTRUCTION	2,141	25	2,166	4,500	(2,334
ALL EXPENDITURES:					
IRON CAPTURE FACTOR	9,795	---	9,795	10,000	(205
WATER CLEANER	1,977	---	1,977	2,000	(23
AGENCIES	5,431	---	5,431	31,000	(25,569
	<u>\$ 411,231</u>	<u>\$ 33,497</u>	<u>\$ 444,728</u>	<u>\$703,458</u>	<u>\$ (258,730)</u>

NOTE:

Our results speak for themselves.

APPROVED FOR
COMMISSION



1-23-92

ED FOR
UTION



1-23-92
DATE



6595 EAST 70TH AVENUE
P.O. BOX 597
COMMERCE CITY, COLORADO 80037-0597
TELEPHONE 303 288-2646

November 18, 1991

Mr. Glenn Bodnar
Colorado Department of Health
4210 East 11th Avenue
Denver, CO 80220

Dear Glenn:

This letter represents, for your approval, the 1992 Operations and Maintenance Budget for the Klein Water Treatment Facility. This budget was prepared in compliance with Chapter IX of the approved O & M plan submitted to the State and EPA in October, 1989.

1992 Budget

Power	\$ 110,000
Repairs and Maintenance	51,700 ¹
Supplies and Chemicals	198,500 ²
Uniforms	900
Utilities and Telephone	3,000
Salaries	229,782
Employee Benefits	53,470
Payroll Taxes	17,579
Truck Expense	800
Quality Control:	
Testing	24,000
Engineering	10,000
Insurance	20,000
Education	<u>3,000</u>
	722,371
Capital Expenditures:	
Type "A" Chlorine Repair Kit	2,000
Safety Equipment	<u>4,000</u>
	728,371
Contingencies	<u>32,000</u>
	<u>\$ 760,371</u>

Mr. Glenn Bodnar
November 18, 1991
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1. This category includes the following expenses:

Administrative/Maintenance	\$ 11,700
Service Contracts	20,000
Equipment Replacement and Repair	<u>20,000</u>
	<u>\$ 51,700</u>

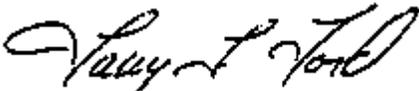
2. This category includes the following expenses:

Carbon Replacement	\$ 180,000
Lab Supplies	15,500
Chemical Supplies	<u>3,000</u>
	<u>\$ 198,500</u>

We are trying to get this budget to you early enough for it to be approved by the end of the year. If you have any questions, please feel free to give us a call.

Sincerely,

SOUTH ADAMS COUNTY WATER
AND SANITATION DISTRICT



Larry D. Ford
District Manager

cc: David Brown, Esq.
Mr. Harley Bryant
Mr. Jimm Michael

LLF/psh